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International Paper & Power Co. Shows Loss

Is Slightly Less, However, Than Previous Year When Loss Was $3,359,716 As Compared With $3,323,432 for 1935—Rise in Selling Price and Substantial Increase in Gross Sales But This Was Offset by Increase in Expenses

Richard J. Cullen, president, in submitting the seventh annual report of the International Paper and Power Company and subsidiaries for the year 1935, to stockholders, states that consolidated net loss after all charges for the year amounted to $3,323,432 as compared to $3,359,716 in 1934. With an increase of 8 per cent in the physical volume of business and a slight rise in average selling prices, there was a substantial increase in gross sales, but this was offset almost entirely by increases in expenses. These increases were primarily due to the larger volume of business.

The gross book value of plants and properties at December 31, 1935 amounted to $222,034,960, an increase of $2,959,936 as compared to the December 31, 1934 figure. This increase reflects the broad program of mill improvements which was undertaken during 1935. No new paper machines were installed, but new supplemental equipment was provided at many mills and existing equipment was rebuilt for increased efficiency and improvement of products. Many expenditures in this connection were of a nature which in accordance with the company's usual policy were charged to repairs. As a result repair charges increased $668,423 over 1934.

Funded debt as shown on the consolidated balance sheet at December 31, 1935 amounted to $67,536,646 reflecting a net reduction of $1,927,047 during the year through sinking funds, maturities and purchases in the open market.

Notes payable amounted to $16,227,659 as compared to $15,228,619 at the end of 1934. A total of $700,960 was paid off on existing loans, but a subsidiary, Southern Kraft Corporation, borrowed $1,700,000 from the banks for plant improvements.

Net working capital of $17,503,882 was $1,089,220 less than the corresponding figure at December 31, 1934, reflecting expenditures for capital improvements and funded debt retirements. Consolidated current assets at December 31, 1935 amounted to $44,161,665 and consolidated current liabilities (including $16,227,659 notes payable) to $26,657,783.

In January, 1936, the Company's Newfoundland subsidiary refunded its 4½ per cent Mortgage Debenture stocks by issuing £1,877,600 of 3 per cent "A" Mortgage Debenture Stock, guaranteed by the British Treasury, and £154,300 of 3 per cent Second "A" Mortgage Debenture Stock. Both new issues mature in 1973.

In March, 1936, the Newfoundland company sold $1,500,000 First Mortgage 4½ per cent Bonds, due January 1, 1968, providing funds for capital expenditures of about $850,000 scheduled during 1936, for special repairs of about $350,000 to its hydro-electric plant referred to below and for reduction of its indebtedness to International Paper Company.

The plan for the readjustment of Continental Paper and Bag Corporation's funded debt was declared operative on March 30, 1936. Over 87½ per cent of the Marinette and Menominee Paper Company First Mortgage 7½ per cent bonds due November 1, 1936 and over 89 per cent of the Continental Paper and Bag Mills Corporation First and Refunding Mortgage 6½ per cent bonds due February 1, 1944, have been surrendered for exchange, par for par, for new 5 per cent bonds due 1960. Interest payments have not been resumed on the unsurrendered bonds.

Operations

In response to better business conditions demand for all grades of paper, pulp and board during 1935 was steadily upward. Prices were generally stable throughout the year and are currently showing an upward tendency. Rising costs, however, continue to restrict profit margins.

During 1935 consumption of newsprint in the United States and Canada was approximately 8 per cent in excess of 1934, continuing the upward trend which commenced in 1933. Notwithstanding the sustained improvement in demand, the price of newsprint remained throughout the year at $40 delivered at New York and Chicago. Effective January 1, 1936 the base price for 1936 was established at $41, an increase of $1 a ton. For the majority of newsprint mills in North America, the new price is still not sufficient to cover much more than cash out-of-pocket expenses for labor, material and transportation to market.

In line with increasing demand the production of most grades of pulp and paper by the Company's subsidiaries

(Continued on page 22)

New Plan of Reorganization for Fraser Co.'s

Issue of Voting Trust Certificates Representing Common Stock Proposed to Settle Deferred Bond and Special Bank Loan Interest—Bondholders and Shareholders Will Meet In Montreal, April 29, to Consider the Plan

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., April 6, 1936—Meetings of the bondholders and shareholders of Fraser Companies, Limited, have been called for April 28 in Montreal to consider a plan for settling deferred bond and special bank loan interest through the issue of voting trust certificates representing common stock, so as to protect the company's working capital position. The proposals would also modify sinking fund requirements and restore the mortgage bonds to the position of first mortgage, cancelling prior lien authorization.

If the plan is duly approved at these meetings, holders of the common stock and voting trust certificates of record April 30 will be given the right, until June 30, to subscribe for 186,866 additional voting trust certificates in the ratio of 1⅛ new shares for each 1 share held (9 to 8) at $12 a share. The subscription warrants will be assignable. Full exercise of these rights by shareholders will permit the payment of all deferred bond and special bank loan interest in cash. If less than the total amount of stock is taken up by shareholders, such cash as has been obtained from the sale of stock will be distributed pro rata to bondholders for accrued and unpaid interest and the balance of deferred interest will be satisfied by proportionate distribution of stock in the ratio of 5 shares per $1,000 principal amount of bonds for each one-year period of accrued and unpaid interest. Distribution will be made to registered bondholders of record June 30 next.

The plan also provides for restoring the present 6 per cent sinking fund mortgage bonds to their original status as a first mortgage issue, which is made possible by cancellation of the authority given under the 1932 plan to issue $2,000,000 of prior lien bonds for banking purposes. There are no prior lien bonds presently outstanding and reduction of the current bank loan has made the authority unnecessary. New first mortgage certificates will be issued and the bonds will be described as 6 per cent first mortgage bonds (instead of sinking fund mortgage bonds), series of 1936, dated and bearing interest from January 1, 1936, and maturing January 1, 1950.

The reason for the proposed plan is referred to by K. S. Maclachlan, president, in a letter to security holders in which he recommends the plan for adoption, and says in part that " . . . even under favorable business conditions the company could not hope to meet in cash as they become due the payments contemplated under the 1932 plan without incurring the gravest risk of seriously depleting its working capital, if not exhausting it, during the period over which instalments on account of deferred liabilities will become due . . . Settlement of the deferred interest liabilities of the company and the change in the sinking fund provisions will benefit the company and its security holders by affording scope, under favorable business conditions, for continuance in the improvement of working capital and earnings which has already been taking place during the four-year period covered by the 1932 Plan of Reorganization . . . "

Contract Awarded for New Plant

The Ontario Paper Company announces that the Foundation Company of Canada has been engaged as general contractor for the company's new development in Quebec province. The development consists of a 60,000 h.p. hydro-electric plant on the Outardes river; with a transmission line to the mill at Baie Comeau; complete development of the logging operations on the Manicouagan river; a two-machine newsprint mill at Baie Comeau, and a town site development at Baie Comeau.

John Stadler has been engaged as general consultant. The entire development is to be completed by June 1, 1938. The design in all departments of the work is now well under way, and it is planned to start construction immediately.

New President St. Lawrence Paper

At the annual meeting here of St. Lawrence Paper Mills Company, Ltd., John I. Rankin was elected president to succeed the late Noah A. Timmins. The vacancy on the board caused by the death of Mr. Timmins was filled by the election of N. A. Timmins, Jr.

At a special meeting preceding the annual meeting unanimous approval was given by the shareholders to a proposal recommended to them by the directors that certain capital assets of the company be written down to present-day values and a corresponding reduction made in the capital account represented by the company's outstanding common shares.

Oxford Paper Co. Granted Exemption

WASHINGTON, D. C., April 8, 1936—The Federal Securities and Exchange Commission has issued an order granting the Oxford Paper Company exemption from provisions of the public utility holding act of 1935. In its order in this connection the commission says:

"Oxford Paper Company having made application for exemption pursuant to the provisions of Section 3 (a) (3) (A) of the Public Utility Holding Company Act of 1935; notice and opportunity for hearing on said application having been duly given; and the record in this matter having been duly considered; and

The commission having found that said applicant is only incidentally a holding company; that it is primarily engaged in a business other than the business of a public-utility company; and that it does not derive, directly or indirectly, any material part of its income from its subsidiary company, Rumford Falls Power Company, the principal business of which is that of a public-utility company;

IT IS ORDERED that the said Oxford Paper Company be, and it hereby is, exempted from all those provisions of the Public Utility Holding Company Act of 1935, which would require it to register under said act because of its owning, controlling, or holding with power to vote, 10 per centum or more of the outstanding voting securities of the aforesaid public-utility company. Since said applicant will not be obliged to register under the act, the aforesaid subsidiary company will not be subject to the obligations which would have been imposed upon it by the act if the applicant had been obliged to register and had complied with that requirement."

Chicago Paper Industry Continues Buoyant

Paper Executives Attribute Improvement to Strength of Basic Factors—Heavy Demand Experienced for Book Papers Up Until April 1, When Advanced Quotations Became Effective—Fine Paper Request Satisfactory

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., April 6, 1936—Markets in the Chicago area were universally strong during the past week. While flood conditions which restricted production in the Eastern mills may have had some influence, local paper executives feel that basic factors continue to count most heavily for the improvement. Book and envelope prices, increased April 1, were firm and the markets were not reported as suffering from the increase itself. The mills were, of course, booked heavily for orders placed prior to April 1. Newsprint indicated a healthier tone following the completion of the Great Lakes Paper deal, while groundwoods were firm and in good demand. Sulphite bonds were "holding their own" while the remainder of the bond and fine paper grades were reported as satisfactory.

The Container Corporation this week announced increase in prices ranging from 10 to 12½ per cent on liner board and a general mark-up of prices on finished containers and boxes. The increases follow closely the advances in prices of box board, announced late last month.

Waste papers were quiet, reflecting the reported stagnation of the Eastern markets.

Wood Pulp Freight Rates

A proposal for extending the reduced rates on imported and intercoastal wood pulp from Atlantic coast ports to Miami Valley destinations and also to apply to southern Michigan points is reported as making rapid headway and the forecast is that a final and favorable decision can be expected this month. The rate on imported and intercoastal wool pulp in the eastern territory is 20½ cents, 21½ cents and, from New York, 23½ cents. The pending proposal is reported to make the same scale applicable on shipments to the southern Michigan mills, exceedingly close to the Chicago territory. The 20½-cent rate expires in January, 1937, according to published statements.

Paper Salesmen Optimistic

The Midwest Division of the Salesmen's Association of the Paper Industry held its regular meeting at the Hamilton Club on Monday, March 30, the meeting being featured for the most part by optimistic reports from sales representatives of the various lines. Outside of this routine report came the announcement from the newly-appointed golf chairman, Burt Fisher of the Bergstrom Paper Company, of the first of the monthly golf tournaments to be held at the Park Ridge Country Club on May 22. A day following Burt's announcement, Chicago was visited by one of the worst snow storms of the Winter. Accordingly, some of the salesmen are considering asking a restraining injunction designed to curb any such announcements until around the Fourth of July, when Spring may have perhaps arrived.

News of the Industry

The Dodge Manufacturing Company of Mishawaka, Indiana, only a few miles from Chicago, is making extensive plans for its display at the annual meeting of the American Pulp and Paper Superintendents' Association to be held at Grand Rapids, Michigan, June 24, 25 and 26. The company joins the Crane Company; Chicago Belting Company and other suppliers of the industry in this respect. Dodge plans a background to its exhibit consisting of a photographic enlargement of its machine shop to be about twenty feet high. The display will include exhibits of power transmission material suitable for the paper mill service and including sectional drives; friction clutches; V-Belt drives and other accessories.

The Container Corporation of America, 111 West Washington street, is now making the finishing touches on its newly-constructed lobby, although the specially-made lobby furniture of modernistic design has not yet put in its appearance. A few additional lighting features along the north wall of the lobby are to be added. An invisible lighting arrangement approximately six feet in length provides the bulk of the artificial lighting. The walls, of a rich brown tone, contain advertisements of the company presented in modernistic glass frames. The lobby itself is connected with the reception room which contains a series of displays of Container and Container supply products.

Included among the number of Chicago executives attending the meetings at White Sulphur Springs this week are J. H. Coy, of the Flambeau Paper Company; and Ray Russell, of the Marathon Paper Company.

W. N. Gillett and Mrs. Gillett have recently returned from a trip to the West Indies which followed their attendance at the National Paper Trade Association meetings in New York City. The head of the Chicago Paper Company returned to the city to find Spring business moving along in a very satisfactory manner.

The sales headquarters of the Consolidated Water Power and Paper Company, formerly located at Wisconsin Rapids, are now at 135 South LaSalle street, in the heart of Chicago's loop. Walter Mead is vice president and sales manager of the concern, which has mills at Wisconsin Rapids, Biron, Appleton and Stevens Point.

Kalamazoo and Ohio TAPPI to Meet

On April 16, at the Park American Hotel, Kalamazoo, Mich., the Kalamazoo Valley Section of the Technical Association will hold a dinner-meeting.

On April 18, at the Anthony Wayne Hotel, Hamilton, Ohio, the Ohio Section will hold a dinner-meeting.

At both meetings the following program will be conducted:

J. P. Hagenauer of the American Paper and Pulp Association staff, New York, will present an address based on the comparison of the operations of 64 Fourdrinier machines, and will cover certain noticeable trends and some conclusions based on a study of the operation of these machines.

W. R. Maull, vice-president of Dill & Collins, Inc., Philadelphia, Pa., and vice-president of TAPPI, will talk on "What Technical Men can Learn from the Practical Beater Engineer."

R. G. Macdonald, secretary-treasurer of the national organization of TAPPI will discuss association activities.

Anyone interested in being present at these meetings will be very welcome.

Demand for Paper Somewhat Irregular in Boston

Although Trading in the Local Market Is Less Active, However, Outlook for Various Grades of Paper Is Generally Favorable—Paper Specialties Moving Slowly At Present—Box Board Market Continues Rather Listless

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., April 6, 1936—Business in the Boston wholesale paper trade was fair last week, although a general estimate would be that it was somewhat less active. In a few instances there was slightly more activity. Prospects for both fine and wrapping paper as a whole, however, are favorable. In some quarters, specialties are reported as not moving so well as a year ago at this time. The box board market continued quiet. Transportation difficulties, occasioned by the flood, have been largely obviated. Paper mills damaged by the flood which ship merchandise to Boston markets are gradually resuming operations.

The paper stock market is not so active as it was. As soon as some of the mills recover from the damage done by the flood, however, with operation resuming, the various grades of paper stock will start flowing in the same channels as previously. Old papers are steady, but there is not very much demand for them, as a large consumer is as yet unable to operate the plant on account of the process of rehabilitation necessitated by the flood. Solid ledger books advanced to 1.50 @ 1.75 from 1.40 @ 1.50, although No. 1 kraft declined to 1.15 @ 1.20 from 1.20 @ 1.25. Bagging in general tended a little easier, with actual reductions in two grades. Australian wool pouches went down to 2.75 @ 2.85 from 2.85 @ 3.00 and heavy baling bagging to 2.00 @ 2.25 from 2.50 @ 2.75.

New domestic rags average in fair demand. In some quarters they are reported as not moving very rapidly on account of the effect of flood conditions and in others as in good demand. O. D. khaki declined on the low side, with the range quoted at .03¾ @ .04¼ compared with a former range of .04 @ .04¼. Old domestic rags are in "nominal" demand. Roofing stock eased off in all three grades quoted. The No. 1 grade declined to 1.90 @ 2.00 from 2.00 @ 2.10; No. 2 to 1.60 @ 1.70 from 1.90 @ 1.95, and No. 3 to 1.50 @ 1.60 from 1.60 @ 1.70. The tendency in foreign rags is easier. It is reported that the demand for foreign rags has entirely disappeared and that American buyers have dropped the price from $3 to $5 a ton. The price of dark cottons, f.o.b. Boston, has declined a few points on the high side, so that the quotation is 1.75 to 1.85, compared with a former one of 1.75 @ 1.90. Old linsey garments have gone down to 2.00 @ 2.10 from 2.25 @ 2.50.

News of the Industry

A full attendance is expected at the April meeting of the New England Paper Merchants' Association, to be held at the Hotel Touraine Wednesday of this week, as it is the first meeting under the new officers and also the first since the Annual Convention of the National Paper Trade Association. Included in the schedule is "the forming of a definite program to chart our course through what Babson predicts may be an unequalled sea of prosperity." The speaker is to be C. Russell Walton, whose talk "What of the Future?" will cover the new-fangled ideas that the Government owes every one a living.

Important matters were discussed at a meeting of the Wrapping Paper Division of the New England Paper Merchants Association and others not members of the association, held Monday at the Chamber of Commerce. H. J. Dowd presided.

Carter, Rice & Co. Corp., have set apart a room on the basement floor of their building at 250 Devonshire street for the twine department. A humidifying apparatus permits the firm to keep the moisture content of the twine relatively the same as when it leaves the mill, preventing drying and loss of strength.

The firm has also installed a small laboratory, in which samples from all the stocking papers are tested for bursting strength, tear and weight. In this way, "we are able to check up on all of our papers and see that they are up to the standard set for each paper, thereby assuring satisfaction to the printer. This also helps to minimize complaints."

Charles W. Fields, vice-president of Baird & Bartlett Company, box board dealers, has just returned from a motor trip to Bath, N. H., on which he passed through some of the flood area, including Lowell, Mass., Nashua, N. H., and other places. He went through East Ryegate, Vt., where at the Ryegate Paper Company's plant, the water was about two feet higher than in the flood of 1927 and five or six feet deep in the basement. The plant was shut down about a week.

Alfred C. Farrel, of the Dennison Manufacturing Company, Framingham, Mass., first vice-president of the Boston Chapter, National Association of Cost Accountants, will lead a large delegation from Boston to the 17th annual international cost conference of the National Association of Cost Accountants at Cincinnati, Ohio, June 22, 23, 24 and 25. Charles H. Cornell, assistant treasurer, Penobscot Chemical Fibre Company, national director and a past president of the Boston Chapter, is to take part in the meeting.

John Brooks, of the Brooks Manufacturing Company, paper wholesalers, has been appointed sales representative for the Spencerian Pen Company in New England.

St. Regis Decreases Loss

Report of St. Regis Paper Company and subsidiaries for 1935, shows net loss of $395,482. This compares with net loss in 1934 of $569,775, exclusive of $1,052,779 book loss on sale of investments which was charged to surplus account.

Consolidated balance sheet as of December 31, 1935, shows total assets of $73,650,901, comparing with $75,327,518 at end of 1934 and total surplus of $17,147,037 against $18,051,036. Current assets as of December 31, including $1,347,206 cash and $183,725 marketable securities amounted to $5,726,906 and current liabilities, exclusive of $4,000,000 demand bank loan, were $1,718,062. This compares with cash and $1,690,624, current assets of $6,367,630 and current liabilities, exclusive of $4,000,000 demand bank loan of $2,331,481, at the end of the preceding year. Inventories amounted to $2,999,715 against $2,889,877. Funded debt of subsidiaries totaled $1,963,500, against $2,108,500 on December 31, 1934.

Ontario Paper Mills Only Moderately Active

Difficulty Experienced In Keeping Nearly All Grades of Paper Abreast With Machines—Practically All Fine Paper Manufacturers Need Considerably More Business—Volume of Coarse Paper Sales Are Rather Light

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., April 6, 1936—Although April promises a better record of business than the paper wholesalers experienced in the month just closed there is no doubt that business generally in most branches of the trade is more or less dull. For some reason or other there does not seem to be much zip to the wholesale paper trade and the market is sluggish. Prices in most lines, however, continue firm and if the trade would only develop some volume selling, conditions would be ideal. Small individual sales, however, continue to exist, with neither the jobbers, printers nor the general consuming trade putting in stocks of any kind. There is a fair demand for Canadian-made blanks, manilas and blottings, but the market for book papers, bonds, writings and ledgers is decidedly dull.

In nearly all lines of paper it is being found difficult to keep orders abreast with the machines and practically all fine paper manufacturers could do with considerably more business. The paper converting trade has not materially improved of late and volume is still light in that department. There is a fair call for greaseproof, waxing and glassine and quite a good demand for lightweight paper lines such as tissues and specialties. The coarse paper market remains quiet with light sales volume.

New Pulp Mill for Newfoundland

It has been reported that International Power and Paper Company, of Newfoundland, are interested in construction of a pulp mill in the Gander area of Newfoundland. The Hon. T. Lodge of the commission of government, and the Newfoundland government director on the board of International Power and Paper Company sailed for England last week with the purpose, it is rumored, of approaching Alan Butler, with whom chief interest in the property is now vested. Color is given the rumor of a mill construction by a statement of Commissioner W. R. Howley that plans are under way for an undertaking which will employ 5,000 men this year. The Gander areas comprise 5,000 square miles of timberlands granted to the Reid Newfoundland Company in 1898 as payment for construction and operation of the cross-country railway. The territory was logged for sawn timber up to 1908, but since has remained practically untouched. It is regarded as perhaps the most valuable piece of pulpwood growth in the country.

Container Co. Improves Position

The annual statement of the Corrugated Paper Box Company, Ltd., presented to the shareholders' meeting in Toronto this week reflects general improvement in the shipping container industry. Net profits for 1935 were $69,866, or $8.97 per share on the 7,835 shares of preferred outstanding, as against $59,713, or $7.62 per share in 1934. The figures for 1935 were arrived at after providing $42,876 for depreciation and income tax reserves of $18,481. A sounder current position is revealed. Current assets have increased $20,412 to $44,765, which resulted in a net improvement in the working capital position of $59,533. In view of the earnings being substantially better in the past two years, regular dividend payments were resumed by the company on its 7 per cent preferred in June, 1935. Indications show that the company should enjoy continued increased earnings during the ensuing year. Business has shown an improvement as compared with the corresponding period of last year. Officers and directors were re-elected, W. A. Woodcoch, of Burgess & Co, replacing O. A. Doherty, who resigned.

Pulpwood Supply In Danger

An unusually early spring break-up in the Ottawa Valley, the St. Lawrence Valley and the Saguenay district is likely to have an adverse effect on pulpwood operations this spring and limit the supply of pulpwood for next season's operations. The break-up has come three weeks earlier than usual, with the result that operators have been caught unprepared, and a large amount of pulpwood is likely to be left in the woods this year. Boom troubles have also been experienced by some companies, but reports received so far appear to have been exaggerated.

At 81 Still Serves Abitibi

"Just as good a man as I ever was, only a little older" is the assertion of James E. Livingstone, of Sault Ste. Marie, Ont., who is probably the Abitibi Power and Paper Company's oldest employee. He was 81 on March 29 and intends to go back to work on the slasher at the paper mill when it opens up this spring. His job there is no snap but he says he is equal to it, and will be for some years yet. Mr. Livingstone went to the Sault the year ship canal construction started in 1888, after having spent some time in California. He helped dig the ship canal at the Sault and started at the pulp mill when Clergue got the mill built. He has been with the paper mill ever since then.

Coarse Paper Interests Affected

Exporters of British Columbia are vitally interested in the new tariff schedule recently tabled in the House of Representatives at Sydney, N. S. W., which includes changes in the rates on wrapping paper and strawboard. Wrapping paper under the British preferences is rescued from nine shillings a ton to five shillings, and under the general tariff from three shillings and sixpence to two shillings and sixpence.

Milwaukee Paper Merchants Expand

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., April 6, 1936—D. Gash & Sons Paper Company, paper merchants, of Milwaukee, Wis., celebrated the concern's fifteenth anniversary by moving into larger quarters. The company now occupies a three-story building at 230 North Water street, where an area of 20,000 square feet will enable it to carry larger stocks and provide for quicker delivery. The company also has enlarged its offices to take care of a rapidly growing business. This is the third time the company has been obliged to take larger quarters. Oscar Gash is president, Martin J. Price, vice-president, Morris A. Gash, secretary-treasurer, and Joseph M. Berliant, sales manager. The company was established in 1921.

Philadelphia Paper Business Outlook Bright

Greater Demand for Various Standard Grades of Paper Anticipated In Immediate Future, Due to Operation of Usual Spring Seasonal Forces —Orders Coming In From Flood Areas to Replenish Damaged Stocks

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., April 6, 1936—It is the consensus of opinion among those in the paper trade here that during April and continuing into May business activity will be speeded up considerably. The usual spring seasonal forces will be operating thus creating greater demand. In addition to these regular spring stimulating forces, paper merchants will receive an impetus from those in the flood area who are already coming into the market to replenish their stocks, etc.

Paper and Cordage Men Dine

The first annual planked shad dinner of the Philadelphia Paper and Cordage Association, Inc., was held at Kugler's famous Sea Food Restaurant, on Thursday evening, April 2. Of the total membership of eighty-eight, sixty-eight were in attendance and enjoyed a splendid dinner and an evening's fun. Entertainment was furnished by talented members of the organization.

A feature of the after-dinner program was the awarding of door prizes furnished by members of the Association. Those receiving boxes of cigars, cartons of cigarettes, potted plants, cakes and pies, by holding lucky numbers included: David A. Wickersham, vice-president of Sanitary Products Corporation of America; Constant Southworth, of Hampshire Paper Company; J. J. Glass, of Ridgewood Paper Company; Nixon H. Richman, of F. W. Winne & Son; Henry Adler, of Huff Paper Company; C. A. Wilder, of Wilder Bros. Company; T. W. Montieth, of J. E. Fricke Company. The free dinner prize was won by J. R. Howarth, of J. R. Howarth Paper Company.

John J. Shinners of Acme Specialty Sales Company, and secretary of the Association, offered a bottle of fine Scotch Whiskey to the member telling the best tall story. Stories were told by George K. Hooper, of Hooper Paper and Twine Company, president of the Association; Harry S. Platt, of Denney Tag Company; Frank Hufnal, of Huff Paper Company; Raymond Armstrong, of F. W. Hoffman Company; F. W. Hastings, of American Writing Paper Company; David A. Wickersham, of Sanitary Products Corporation of America and E. K. Lay, of E. K. Lay Company, chairman of the Association's Entertainment Committee.

The committee of awards, consisting of John Heverly of Garrett-Buchanan Company; Fred I. Brower, of Atlantic Gummed Paper Corporation; and A. B. Sherrill, gave the prize to Henry C. Forrest, who was a guest of President Hooper. Mr. Hooper was rather embarrassed that his guest should walk off with this fine prize. However, Mr. Forrest was a master story-teller and well deserved his prize.

James Andrews, of Schuylkill Paper Company; and Vincent Dirvin, of Paper Manufacturers, Inc.; were unable to attend the party as they were both confined to their homes by illness. A motion was carried that telegrams of sympathy be sent to these two gentlemen who are loyal members of the Association.

The dinner was arranged by the Entertainment Committee of the Association, consisting of T. W. Montieth, of J. E. Fricke Company; Fred I Brower, of Atlantic Gummed Paper Corporation; Samuel Shyrock, of Shyrock Brothers; J. R. Howarth, of J. R. Howarth Paper Company; Frank T. Hufnal, of Huff Paper Company; and E. K. Lay, of E. K. Lay Company, chairman.

Plans are now under way for the Association's Annual Outing, to be held during the month of June. The committee plans to make this year's outing the best one ever held. The date will be announced at the Association's next regular meeting, to be held at 12 o'clock noon, April 17, at Hotel Adelphia.

Application for membership in the Association was received from James W. Garrett of Garrett Paper Company, who has just recently established the paper business at 1614 Summer street. Mr. Garrett was formerly with Atlantic Paper Company; also from The Union Envelope Company, 892 Drexel Building, represented by Robert Murray, local representative.

Scott Paper Co. Declares Dividends

The Board of Directors of the Scott Paper Company, Chester, Pa.; at a meeting held March 27, declared the regular quarter dividend of 1¾ per cent, one dollar and seventy-five cents ($1.75) per share on the 7 per cent, Series A, Cumulative Sinking Fund Preferred Stock of the Corporation, payable May 1, 1936, to all stockholders of record at the close of business April 16, 1936. Checks will be mailed.

All dividends on the Preferred Stock of this Corporation and its predecessors have been earned to date and paid when due without any exception.

Michael P. Philpot Dead

Michael P. Philpot, formerly widely known in the paper box-making trade here, and founder of the firm which bore his name, died on Tuesday last in his 87th year. Funeral took place on Saturday from his late residence, 1821 Berks street, following services in the Church of Our Lady of Mercy. Mr. Philpot retired from active business toward the close of the last century.

Kimberly-Clark Plans Additions

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., April 6, 1936—Preparatory to a building program, the Kimberly-Clark Corporation, Neenah, Wis., has purchased a block of land adjoining its main office building and cellucotton plants. The tract includes seven store front spaces occupied by retail establishments. All of the tenants will vacate the premises in the near future so the buildings can be razed. Several additions will be made to the present plant, and the main offices will be enlarged. F. J. Sensenbrenner, president, expects to make announcement soon as to the details of an expansion program approximating one million dollars.

R. T. Vanderbilt & Co. Expand Laboratories

The R. T. Vanderbilt Company, Inc., with offices at 230 Park Avenue, New York City, is now building a large addition to its present laboratories at Norwalk, Conn. Construction work will continue during the spring months and it is expected that the new building will be completed and all equipment installed by June first this year.

Designed by H. T. Lindeberg

The new laboratory was designed by H. T. Lindeberg of New York City, one of the best known architects in the country. It will be a three story red brick building with white trim, containing approximately ten thousand square feet of laboratory space. The style is true Colonial similar in character to the present laboratory completed in 1929. The two buildings will be connected and together will form a most complete, modern and efficient plant.

PERSPECTIVE DRAWING OF NEW LABORATORIES OF R. T. VANDERBILT & CO.

Growing Demand Makes New Laboratory Necessary

The steadily growing demand for Vanderbilt products and the continual addition of items have made this new laboratory essential. It will provide better working conditions and ample space for developing new products as well as for expanding the uses of products now handled.

The general chemical laboratories, the ceramics and rubber laboratories will remain in the old building, expanding to take over the space vacated by the paper, paint and textile laboratories which will be moved to the new addition.

In the new building, the third floor will be entirely devoted to paint work with provision for exterior weathering tests on the roof. The equipment will include all the usual facilities for the grinding and mixing of paint, a separate room for experimental work on varnish manufacture, and complete facilities for testing. A constant temperature or humidity room for drying and for film tests will be an added feature.

Investigations on Paper

The second story will be given over to investigations on paper and the latest developments in apparatus for physical testing will be installed. There will be a constant temperature and humidity room on this floor also. Experimental coating work will be done on a newly developed machine fully equipped with drier and a supercalender. The new type of British hand sheet mold, recently adopted by TAPPI will be added. There will be large mixing tanks installed for the preparation of coatings on a semi-commercial scale.

The textile laboratory will be on the ground floor. Back of this will be storage and filing space. There will be a separate fire-proof building for the storage of inflammables, a new machine shop and a new power plant. The apparatus for temperature and humidity control and also air compressors will also be on the ground floor.

Upon completion the new Vanderbilt laboratory will be open for inspection and the Vanderbilt Company will be prepared to render even better and more complete services to all members of the paper industry.

Make Provision for Distinctive Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C. April 8, 1936—The following provision is made for the purchase of distinctive paper in the appropriation bill of the Treasury Department:

Distinctive paper for United States securities: For distinctive paper for United States currency and Federal Reserve bank currency, including transportation of paper, traveling, mill, and other accessory expenses, and salaries of employees and allowance, in lieu of expenses, of officer or officers detailed from the Treasury Department, not exceeding $50 per month each when actually on duty; in all, $600,000: *Provided,* That in order to foster competition in the manufacture of distinctive paper for United States securities, the Secretary of the Treasury is authorized, in his discretion, to split the award for such paper for the fiscal year 1937 between the two bidders whose prices per pound are the lowest received after advertisement.

Obituary

John E. Babbitt

[FROM OUR REGULAR CORRESPONDENT]

BELLOWS FALLS, Vt., April 6, 1936—John E. Babbitt, president of the Robertson Paper Company and one of this city's most prominent citizens, died suddenly from a heart attack recently.

John E. Babbitt was born in Bellows Falls January 21, 1872, the son of George Hewes and Frances Allen (Johnson) Babbitt. He attended the Bellows Falls High School and afterward went to Bryant and Stratton Business School. For several years he was associated with his father in the American Express Company.

Deciding that he wanted a college education, he went to Brown University at Providence, R. I., graduating from there in 1899.

For nearly thirty years Mr. Babbitt was identified with the paper industry in Bellows Falls. Following graduation from college, he bought out the Bellows Falls Machine Company, the former Osgood & Barker Company. He was joined in this venture by his two brothers, Frederick H. and George H. Babbitt, and together they developed in this company the then largest waxed paper plant in the United States.

He also joined his brothers in the purchasing, enlargement and operation of the Howland Pulp and Paper Company in Howland, Me.

The Bellows Falls Machine Company was later merged with the Robertson Paper Company, F. H. Babbitt taking over the manilla end and John E. Babbitt maintaining the wax end of the business. John Babbitt was treasurer of the company for many years and in 1921 when F. H. Babbitt left the Robertson Paper Company to form the Babbitt-Kelley Company, he became president.

Mr. Babbitt was formerly president of the Bellows Falls Chamber of Commerce. He served for many years as a director of the Brattleboro Trust Company, resigning in January, 1931. He was a member of the old Westminster Club here and of the Walpole and Bellows Falls Country Clubs. He was also a member of the New England Council.

June 15, 1915, he married Marion Barney of Milwaukee, Wis. Three daughters also survive, Sara and Constance, students at Vassar College and Elizabeth, a student at boarding school.

Edward P. Hulse

Edward Pierce Hulse, chairman of the Graphic Arts Division of the A. S. M. E. and a member of the board of the Graphic Arts Research Bureau, died in New York City, Friday, April 3. Mr. Hulse was born in 1870, of old New England stock. He had specialized for the last thirty years in design of printing equipment and lay-out of printing plants. He was for a number of years a partner in Crittenden & Hulse, consulting firm. For several years Mr. Hulse was technical editorial assistant to John A. Hill's Engineering Publications, now part of McGraw-Hill.

During the World War, Mr. Hulse was very active and did a great deal of publicity work for the Boy Scouts. For several years he was manager of the merchandise department of the Type Founders Company. From 1928 to 1934, he was an associate editor on the editorial staff of A. S. M. E. From 1927 until his death he was very active in the Graphic Arts Division of the Society and was responsible for the development of the conferences they sponsored in the printing industry. He was also one of the organizers of the Graphic Arts Research Bureau and was the author of several books and numerous articles. Among the books were: History of New Jersey; Photo-Offset Process—a Practical Treatise.

Mr. Hulse left no immediate family.

Harry Pickess

Harry Pickess, treasurer of the Great Eastern Paper Stock Company of Long Island City and Hoboken, died March 22 at his home in Maywood, N. J.

Mr. Pickess was born in England. He was formerly with the Hudson Packing Company of New York and the Bowater Paper Company of London, England. His widow and three daughters survive.

To Study Fiscal Problems

With the object of aiding in the promotion of economic stability, the Chamber of Commerce of the State of New York has decided to create a special committee on fiscal policies. It will study the broader questions of finance and taxation which involve the general fiscal problems of the country. President Thomas I. Parkinson is chairman of the committee.

The chamber's action in setting up the special committee was the outgrowth of a special meeting last August at which the president was authorized to "take steps to coordinate the efforts of owner and administrators of business enterprises, stockholders, policyholders, savings bank depositors, employees and other citizens whose economic interests are associated with the future welfare of this country in order to secure the intelligent consideration and wise solution of the serious fiscal problems now facing the taxpayers of the United States."

Consideration has been given to the problem continuously since then by the officers of the chamber, who consulted with business and financial leaders both within the organization and without. While anxious to avoid committing the chamber to a program it might not be able to accomplish effectively, it was felt that the fiscal problems which confront the country were of such supreme importance that political action alone could not be expected to solve them.

Among the subjects to be studied, are: banking and the problem of sound credit policies, costs of government and taxation and distribution of the tax burden; public indebtedness and deficit financing, and in the position of gold and silver in the monetary system.

Kraft Production In Norway

While Sweden and Finland are of greater importance as producers of kraft paper than Norway, the latter's production is not without its effect on the world's markets, according to Vice Consul Brockholst Livingston, Oslo. At the present time there are in Norway three large and three small mills producing kraft paper, with a total capacity in the neighborhood of 45,000 metric tons (metric ton 2,205 pounds) per annum. Production has been maintained at between 36,000 and 43,000 tons yearly, except in 1931, when it dropped to 22,500 tons. Alterations to machinery with a view to improving the output is now being undertaken in these mills, but no increased capacity is anticipated.

Approximately 70 per cent of the Norwegian production of kraft paper is exported. The United Kingdom is generally the principal purchaser. Sales to the United States during the last four years have been less than 1 per cent.

New TAPPI Members

The executive committee of the Technical Association of the Pulp and Paper Industry has announced that the following have been elected to membership:

Robert Caldwell, vice president, J. & J. Rogers Company, Ausable Forks, N. Y., where he has been since 1904.

T. A. Carlson, Engineer (acting in charge of Container investigations), Forest Products Laboratory, Madison, Wis., is a 1917 graduate chemical engineer of the University of Wisconsin. Mr. Carlson was formerly with the American Smelting and Refining Company and the Anaconda Copper Mining Company in Montana.

H. H. Coolidge, vice president and mill manager, Flambeau Paper Company, Park Falls, Minn., is a 1908 graduate of Yale University. Mr. Coolidge was formerly with the Pacific Mills, Ltd., Ocean Falls, B. C. The Crown Willamette Paper Company, Camash, Wash., V. D. Simons, Chicago, and the Munising Paper Company, Munising, Mich.

Paul de Guehery, Chemical Engineer, Michigan Paper Company, Plainwell, Mich., is a 1910 graduate of the University of Dresden (Germany). Mr. De Guehery was formerly works manager of the U. S. Gypsum Company, North Kansas City, Mo., chemical engineer for the Paper Makers Chemical Company, Lockport, N. Y. and assistant superintendent of the Canada Paper Company, Windsor Mills, Ontario.

Eric O. Ericsson, Chemist, Puget Sound Pulp and Timber Company, Bellingham, Wash., attended the University of Washington.

Carl C. Gehrig, Paper Tester, Oswego Falls Corp., Fulton, N. Y., is a 1935 graduate of the New York State College of Forestry.

V. Gardiner Heinmuller, Chemist, American Cyanamid and Chemical Corporation, Kalazamoo, Mich., is a 1913 graduate of Pratt Institute.

George H. Herrold, Director, St. Paul Planning Board, St. Paul, Minn., is an 1896 graduate of Stanford University and formerly engineer for the U. S. Geological Survey, The Great Northern Railway and the Chicago Great Western Railway Company.

Harrold Hibbert, E. B. Eddy, Professor of Industrial and Cellulose Chemistry, McGill University. Dr. Hibbert is a graduate of Victoria College, Manchester, England, and has been a professor at the University of Wales, Tufts College and Yale University. He was also a research chemists for the Mellon Institute and E. I. du Pont de Nemours & Co. and has been the author of more than one hundred publications relating primarily to the chemistry of cellulose, lignin and related compounds.

Don A. Nesbitt Honored

[FROM OUR REGULAR CORRESPONDENT]

DAYTON, Ohio, April 6, 1936—Don R. Nesbitt, who has been identified with the Cincinnati Cordage and Paper Company, and who recently was elected a director of that organization, was the successful candidate for the Presidency of the Junior Chamber of Commerce of Dayton at its annual election, held during the past week.

The newly-elected president is a son of A. T. Nesbitt, who recently was elected president of the Cincinnati Cordage and Paper Company. Nesbitt established the Dayton branch of the company immediately after the disastrous flood in 1913, although he had been connected with the firm prior to that time as a salesman. His son also has served as salesman for the company and has been active in civic work for several years.

American Writing Decreases Loss

The American Writing Paper Company, Inc., reports for the 1935 calendar year a net loss, after all charges, including allowance for interest on bonded debt and idle property carrying charges of $354,954, compared with a loss after all charges in 1934 of $504,210. Net sales for 1935 were $5,421,692 and for 1934 were $4,682,412.

Balance sheet dated December 31, 1935, showed total current assets of $1,769,251, of which cash amounted to $270,873. Total current liabilities were $172,580. This figure is exclusive of liabilities to trade creditors and others incurred prior to June 25, 1934 of $240,344 and $618,420 of accrued interest on bonds. At the end of 1934 current assets were $1,816,805 and current liabilities $445,799, exclusive of $390,655 of accrued bond interest and liabilities to trade creditors and others incurred prior to June 25, 1934.

President Wilson says in part to stockholders: "While operating under authority of the Court, it has been necessary to limit all expenditures for betterments to those absolutely required by competition in order to retain business. If the company's business is to prosper, needed expenditures on its properties cannot be much longer deferred.

"It is imperative that a speedy reorganization be effected if the assets of the company are to be conserved, if the good will is to be retained and if the present volume of business is to be sustained and increased.

"A Bondholders' Protective Committee, representing a substantial amount of bonds, and a Merchandise Creditors' Committee, representing over two-thirds in amount of the allowed unsecured claims against your company, have already approved the plan proposed. Stockholders should act promptly. They should bear in mind that thus far the court has neither approved nor disapproved the plan in respect to its fairness but has authorized the company to submit the plan to stockholders and creditors who may express their acceptance on the forms approved by the court.

The fairness of the plan will be considered by the court when acceptances in the requisite amount have been received from stockholders and creditors."

Masonite Profits Higher

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., April 6, 1936—Net profits of $540,014,43 have been earned by the Masonite Corporation, Wausau, Wis., in the first seven periods of its fiscal year from September 1, 1935 to March 14, 1936. This is a substantial increase over the same periods of the previous fiscal year, when net profits were $301,197.80.

Gross earnings were shown by the company's statement to be $1,465,058.25, as compared to $989,584.57 for the corresponding period a year ago. After deducting preferred stock dividend requirements, the earnings up to March 14 equal $1.83 per share on 266,689 shares of common stock outstanding. This compares with 93 cents a year ago. Earnings reported are after deduction of all charges, including depreciation and income taxes.

"It is gratifying to be able to report progress at this time," states Ben Alexander, president. "This increase came during what are ordinarily the dullest months of the year for companies engaged in the production of building materials. The building season is now opening up and our sales volume is steadily increasing. Many industries have been making new use of our products, which has led also to the expansion of sales and production."

The company's mills are located at Laurel, Miss.

INTERNATIONAL PAPER & POWER CO. SHOWS LOSS

(Continued from page 13)

increased as compared to 1934. The comparative production figures by tons are summarized as follows:

	1935	1934
Newsprint	720,629	754,575
Groundwood specialty papers	121,917	95,864
Book and bond papers	102,148	88,681
Southern Kraft paper and board	459,539	364,786
Pulp for sale	173,537	160,232
Tissue and wrapping papers	54,617	55,685
Bags	73,654	58,961
Total	1,706,041	1,578,784

The above figures do not include pulp produced by mills for their own use in the manufacture of paper.

On January 25, 1936, a burst penstock flooded the hydro-electric plant of the Company's Newfoundland subsidiary, with serious damage to the generating equipment. The preliminary estimate of the cost of the repairs to be made is $350,000. Limited operation was resumed on February 1, 1936 and since February 6, sufficient power has been available to operate the paper mill at about 70 per cent of rated capacity. It is expected that repairs will be completed to put the mill in full production by April 15.

The unprecedented spring floods of 1936 forced suspension of operations at mills of International Paper Company at Livermore Falls on the Androscoggin River and at Continental Paper and Bag Corporation's mills at Rumford on the Androscoggin River and at York Haven on the Susquehanna River. Timber crib dams at Livermore Falls were breached but operations have already been resumed on a curtailed basis. At the other points no permanent damage was done, but premises were flooded and operations could not be resumed until equipment had been cleaned up and dried out. As the floods have not entirely receded the exact cost of repairs cannot yet be determined.

International Hydro-Electric System and Subsidiaries

Included in the report is a Statement of Consolidated Profit and Loss and Earned Surplus for the year 1935 and a Consolidated Balance Sheet at December 31, 1935, of International Hydro-Electric System and subsidiaries.

The annual report for 1934 referred to the Act passed by the legislature of the Province of Ontario in April, 1935, declaring void and unenforceable against the Hydro-Electric Power Commission of Ontario two contracts under which Gatineau Power Company (International Hydro-Electric System's principal operating subsidiary in Canada) derived nearly one-half its gross revenue. This Act was made effective by proclamation of the Lieutenant Governor-in-Council in December, 1935. New contracts have been entered into with the Hydro-Electric Power Commission, under which both the unit price paid and, initially at least, the amount of power to be taken by the Commission are substantially lower than in the old contracts. Yearly revenue under the new contracts will, it is estimated, drop some $2,000,000 below the annual basis under the old contracts at the time they were declared void. The new contracts contain provisions under which revenue to Gatineau Power Company may be increased through additional takings by the Commission, but even on the maximum basis such revenue would still be some $700,000 less than would have been received for the same amount of power under the old contracts.

Holding Company Act

Both International Paper and Power Company and International Hydro-Electric System filed with the Securities and Exchange Commission applications for exemption from the provisions of the Public Utility Holding Company Act on the grounds that neither company is itself a public utility company or derives any material part of its income from subsidiary companies the principal business of which within the United States is that of public utility companies. Before making its application for such exemption International Paper and Power Company acquired from International Paper Company its holdings of common stock of International Hydro-Electric System and capital stock of The Olcott Falls Company and from Canadian International Paper Company its holdings of Class A Preferred and Common Shares of Newsprint Bond and Share Company.

Of the companies comprising the International Hydro-Electric System group only New England Power Association has filed with the Commission a notification of registration under the provisions of the act. To qualify for exemption the System turned over to voting trustees the right to vote its common shares in the Association and the trustees have registered as a holding company The term of the trust is limited and the System retains for the benefit of its own security holders its property rights in the Association shares including the right to receive dividends if at any future time the Association should resume dividends on its common shares.

Imperial Paper To Reorganize

HUDSON FALLS, N. Y., April 6, 1936—A special meeting of stockholders of the Imperial Paper and Color Corporation is to be held on May 1, for the purpose of considering and voting upon a plan to reorganize the company by the consolidation of the corporation and four of its subsidiaries. Directors believe that an increase in efficiency and a saving in operation will result from a consolidation of the corporation and the manufacturing subsidiaries and have recommended such action to stockholders. The plan is to form a new company to be known as Imperial Paper and Color Corporation with a capitalization of $4,000,000. The new organization will purchase the assets of the present corporation, excepting the stock of the manufacturing companies, and will pay for the same in stock. This stock will be transferred to the parent corporation and in turn the present corporation will exchange the stock as acquired for the stock now held by its stockholders. When this change is effected the stockholders for the present corporation will be sole stockholders of the new corporation, having the same number of shares and the same interest in the assets as before reorganization. The present corporation and its manufacturing subsidiaries will then be dissolved. The corporation is the sole owner of the capital stock of the Imperial Wall Paper Company, Plattsburg Wall Paper Company, Underwood Paper Mills and Imperial Color Works.

River Raisen To Open New Branch

The River Raisen Paper Company will open another branch plant at Washington, Pa., around May 1, G. H. Wood, president of the company, says in his 1935 report. This, with the new Cleveland plant, will provide a more steady operation for the home plant, he said. Production last year was at 65 per cent of capacity and the company expects to do better this year.

Flood Conditions Affect Indianapolis

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., April 6, 1936—Flood conditions in many sections of the state, particularly the southern section, have slowed business in the paper trades this week to some extent. Only some items have been adversely affected, other items apparently being held firm in demand with even some expansion noticed. As far as could be learned, no mills or converting plants in the flood areas were compelled to close operations because of high water but conditions were such that trading in the affected areas was slowed down and demand for wrapping papers and bags was affected.

Insofar as the central section of the state is concerned, there was no appreciable change in business, except for the better. Local bag companies report a very nice demand, much of it from millers, fertilizer and feed and seed trades. These in particular seem to be ready buyers and the local manufacturers catering to this trade are working overtime.

The container business also remains good. It has been practically impossible for local factories to supply demand even with considerable overtime production. Warehouse stocks are very light for this time of the year. The box industry also continues on the upgrade. Factories in this section are working overtime. Here, too, warehouse stocks are low, it having been impossible to build them up because of the active demand.

Kraft and the wrapping paper demand continues fair. Prices are being held in line and the local jobbers believe a turn in weather conditions will stimulate the market. At least the undertone is strong. Tissues are moving nicely with prices steady.

Some inquiries are being received for summer specialties, but the demand has not yet started. Weather conditions have not been right for these grades as yet. A good demand is seen for building papers of all kinds. The large amount of general repair work that started late in the winter has created an early demand for building papers and the indications now are that the season will be far ahead of last year. Prices are strong.

Golden Gate Metallurgists Discuss Steel Castings

The Golden Gate Chapter of the American Society for Metals at Berkeley, California, listened to an address on the subject of steel castings by A. G. Zima at their March 16 meeting.

Mr. Zima's talk dealt with the increased scope of engineering design and improvement in the foundry production of steel castings now possible because of the more complete control exercised over the variable factors in the foundry, and the wider use of the alloying principle. Data on the properties and uses of cast nickel alloy steels were included.

Mr. Zima is field representative on the west coast for the development and research division of The International Nickel Company, Inc.

Paper Products Co. Shipments Double

Shipments of Detroit Paper Products for the first quarter will more than double the volume of the corresponding period last year, according to Seymour H. Franklin, president. Net profit for the current quarter will be the largest in any three-month period in the company's history, he said.

The plant is operating 24 hours a day, seven days a week, he said.

Pioneers Merchandising Study

The National Paper Trade Association has recently committed itself to pioneering a merchandising study in the field of distribution of paper and paper products and twines.

For many years this association has conducted cost studies and has been actively engaged in acquainting both the manufacturers and the merchants with the existing costs of distribution. Surveys have been made annually and the results of such surveys clearly indicate that the wholesaling function as performed by established paper merchants results in distributing paper and paper products probably more economically than it can be done through any other channel.

The purpose of the merchandising study is apparently to keep the paper distributing trade abreast of the times and by the pooling of the intelligence of the trade, render a more efficient service to the public interest and to safeguard the distribution function which the merchant renders.

It is understood that some studies will be made in the field of storage, handling, delivery, routing of orders, etc. Attempts will undoubtedly be made to determine how overhead expense may be reduced through increasing the average order size, better selling methods, better coverage, standardization and simplification of merchandise lines, etc.

Some study is expected to be made of packaging and merchandising ideas as applied to certain particular twine and paper items.

One of the first tasks undertaken by the Wrapping Paper Merchandising Committee is the promotion of the use of standard size illustrated catalog pages for salesmen's catalogs. A four-page folder on this subject is now being prepared for mailing to wrapping paper merchants.

Government Paper Awards

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 8, 1936.—Reese & Reese, Inc., have been awarded the contract for furnishing the Government Printing Office with 2,000 sheets of 24 x 36 Quaker drab cloth lined cover paper at $153.00 per M sheets, bids for which were received on March 18.

The R. P. Andrews Paper Company will furnish 9,230 pounds of 50 per cent rag cream white laid cover paper at 13.09 cents and the same firm will also furnish 30,845 pounds of 30 x 45" single coated book paper at 6.35 cents per pound. Bids for both of these items were received on March 28.

The Printing Office received the following bids for 6,250 pounds of 50 per cent rag blue antique cover paper; R. P. Andrews Paper Company, at 11.5 cents per pound; Whitaker Paper Company, 11.9 cents; Mathers-Lamm Paper Company, 12.5 cents; Reese & Reese, Inc., 12.56 cents; Barton, Duer & Koch Paper Company, 12.56 cents; and Stanford Paper Company, 11.11 cents.

Baldwin to Carry McLaurin-Jones Grades

The Baldwin Paper Company, 233-245 Spring street, New York, has been appointed a distributor for the complete line of mill brand products of the McLaurin-Jones Company, some of the important grades being guaranteed flat gummed papers, ungummed label papers, box cover papers and metallics and Hollands. The Baldwin Paper Company will carry an adequate stock of these grades and will be in a position to render prompt and efficient service.

CONSTRUCTION NEWS

A Summary of Vital Facts Regarding Construction, Finances and Operation of Paper Mills

Construction News

Brooklyn, N. Y.—The Scandore Paper Box Company, 35 Steuben street, manufacturer of paper boxes and containers, is considering plans for new three-story plant addition at Steuben street and Park avenue, including improvements in a five-story factory unit on Park avenue. Large increase in present capacity will be carried out. Entire project is reported to cost over $75,000, including equipment.

Fernandina, Fla.—The Container Corporation of America, Inc., 111 West Washington street, Chicago, Ill., manufacturer of corrugated paper boxes and containers, is selecting site at Fernandina for proposed new plant, for which detailed plans will be arranged in near future. New unit will be of large proportions and is reported to cost over $200,000, including equipment. J. J. Broussard is vice-president, in charge of operations.

Cleveland, Ohio—The Peerless Paper Box Manufacturing Company has been organized with capital of 250 shares of stock, no par value, and plans operation of local plant for manufacture of paper boxes and containers. Incorporators of new company include W. B. Stewart and Walker H. Nye. It is represented by Charles Follett, Terminal Tower Building, Cleveland.

Atlanta, Ga.—The Southern Waxed Paper Company, Woodrow avenue, S. W., manufacturer of waxed and other processed papers, has awarded general contract to Sam W. Hodges Company, 262 Rumson road, N. E., for proposed new addition to plant, recently referred to in these columns, and will proceed with superstructure at once. New unit will be one-story, 50 x 200 feet, and is estimated to cost in excess of $50,000, including equipment. Benjamin Lacy is general manager, in charge.

Chester, Pa.—The Scott Paper Company, Inc., manufacturer of tissue papers, etc., has arranged for increase in capital from 141,599 shares preferred stock to 150,000 shares, $100 par value, and from 800,000 to 1,000,000 shares, common stock, for general expansion.

Baltimore, Md.—The Maryland Paper Products Company, 1200 South Eutaw street, will soon begin remodeling and improvements in building recently acquired, and will equip for increase in present capacity. Work is reported to cost over $35,000.

Cleveland, Ohio—The Dobeckmun Company, 3301 Monroe street, manufacturer of cellophane products, has work under way on new addition to converting plant, previously referred to in these columns, and will push the project to completion early in the spring. New unit will be one and two-story, 116 x 162 feet, with portion to be used for office and operating service. Work will also include a second-story addition to an existing building, 40 x 100 feet. The Bison Company, 12406 Marston avenue, general contractor, is awarding miscellaneous sub-contracts for millwork, plumbing, heating, wiring, etc. Entire project will cost over $100,000, including equipment. George S. Rider Company, Marshall Building, Cleveland, is architect and engineer.

Louisville, Ky.—The Miller Paper Company, 118 East Main street, has filed notice of increase in capital from $100,000 to $175,000, for general expansion.

York, Pa.—Penn Fibreboard Corporation, manufacturer of pulp and sulphite board products, plans early rebuilding of portion of storage and distributing department, recently damaged by fire. Loss estimated close to $10,000.

Philadelphia, Pa.—Tompkins Label Service, Frankford and Allegheny avenues, manufacturer of gummed paper labels, etc., will soon begin installation of new equipment for increased efficiency and production in different departments. J. Kirby Tompkins is head.

Valparaiso, Ind.—The Continental Diamond Fibre Company, Newark, Del., has begun construction of new one-story branch plant, 60 x 100 feet, at Valparaiso, with storage and distributing facilities for division service. General contract for unit was recently let to the Smith-Nuppan Company, Valparaiso. Company will remove Western division headquarters from Chicago, Ill., to new location at early date. New unit will cost about $40,000, including equipment. L. L. Howard is local manager.

Hamilton, Ont.—Gerald T. Shipman Paper Company, 32 Front street West, Toronto, Ont., manufacturer of paper products, has plans under way for new plant at Hamilton, comprising two main units, each one-story, 50x440 feet, and 50x150 feet, respectively. Proposed to begin work at early date. It is estimated to cost in excess of $130,000, including equipment.

Otsego, Mich.—The Mac Sim Bar Paper Company, manufacturer of box board, chip board and kindred paper products, has completed plans for new one-story addition to mill, including improvements in present plant. General contract has been let to Henry Vanderhorst, Kalamazoo, Mich., and work will be placed under way at once. Cost estimated close to $30,000.

Neenah, Wis.—The Kimberly-Clark Corporation, Neenah, is said to have preliminary plans under consideration for new one-story addition to local mill on North Commercial street. No estimate of cost has been announced.

Monroe, Mich.—The Monroe Steel-Kraft Company, manufacturer of paperboard products, including panel boards for automobile service, plans early rebuilding of portion of mill, recently destroyed by fire. Steam power house at plant was also destroyed and will be rebuilt. Entire loss is reported over $200,000, including equipment.

Albany, N. Y.—The A.P.W. Paper Company, 1275 Broadway, manufacturer of tissue paper stocks, etc., has rejected bids recently received on general contract for new addition to mill on Bridge street, to be known as Building E, and will ask new bids at early date. New structure will be used primarily for storage and distributing service,

Do you still screen paper stock the way you did in the twenties?

If so, the chances are you're hard put to it to turn out paper that's up to 1936 quality standards. . . . Screening practices have changed . . . improved. So have Bird Screens. . . . We'd like to show you how easily and inexpensively you can arrive at the right combination of screen slot size and effective screening area to give you paper that meets today's standards of cleanness at lowest screening cost per ton. . . . Others making your kind of paper are doing it and cashing in on it. Why not you?

BIRD MACHINE COMPANY · SOUTH WALPOLE, MASSACHUSETTS

BIRD SCREENS

YOU CAN MAKE MORE MONEY WITH NEW BIRD MACHINERY

and is reported to cost over $75,000, including equipment. Company will also make improvements in present mill units. Johnson & Wierk, Grand Central Terminal, New York, N. Y., are consulting engineers.

Newton Falls, N. Y.—The McCormick Tablet Corporation, manuafcturer of writing pads, tablets, etc., has filed notice of change of company name to the St. Lawrence Tablet Company, Inc.

Kaukauna, Wis.—The Thilmany Pulp and Paper Company, manufacturer of tissue, waxed and other processed paper stocks, has plans maturing for proposed new addition to mill, previously referred to in these columns, and will begin superstructure early in the spring. It will be two-story, estimated to cost over $50,000, with equipment. New unit will be used for expansion in beater room and bleach department. It is understood that general contract will be awarded without a call for bids. Charles R. Seaborne, general superintendent, is in charge.

Detroit, Mich.—The Detroit Paper Products Corporation, 5800 Domine street, is running on a capacity schedule for its different paper specialties, with 24-hour day, seven-day-week working basis, giving employment to maximum working force in all departments. It is proposed to continue on this basis for an indefinite time, with immediate orders insuring such rate of output until well in the fall. Company is also advancing capacity in its recently established plastics division.

Long Island City, N. Y.—The American Paper Products Company, Inc., 219 36th street, Brooklyn, manufacturer of paper goods, has leased space in building at 24 Orchard street, Long Island City, totaling about 18,500 square feet, and will occupy for expansion. It is understood that present plant will be removed to new location.

Hinsdale, N. H.—The Hinsdale Paper Manufacturing Company, manufacturer of tissue and other paper stocks, has asked bids on general contract for rebuilding of portion of mill destroyed by fire a number of months ago, previously referred to in these columns. It is expected to award building contract and begin work in April. Fire loss approximated $200,000. New paper-making machinery and auxiliary equipment will be installed. McClintock & Craig, 458 Bridge street, Springfield, Mass., are consulting engineers.

Whitinsville, Mass.—The Kupfer Paper Manufacturing Company plans rebuilding of mill, which collapsed on March 19, when flood waters from the West River undermined the foundations of the structure. No official estimate of loss has been announced. Considerable equipment was damaged.

Hamilton, Ohio—The Beckett Paper Company, manufacturer of bond and other writing papers, has completed revised plans for proposed new power plant at mill, and will take bids on general contract at once. New high-pressure boilers and auxiliary equipment will be installed. New station is reported to cost over $200,000, with equipment. Fosdick & Hilmer, Union Trust Building, Cincinnati, Ohio, are consulting engineers.

New Companies

Warsaw, Ind.—Simmons Paper Products, Inc., 101 East Center street, has been organized with capital of $100,000 and 20,000 shares of common stock, no par value, to manufacture and deal in paper products of various kinds, pulp specialties, etc. The incorporators include: Paul R., Raymond R. Simmons, and Roy O. Anderson.

New York, N. Y.—The Crescent Paper Supply Corporation has been chartered with capital of 100 shares of stock, no par value, to deal in paper products of various kinds. Louis G. Langer, 60 East Twenty-third street, is one of the principal incorporators. Philip Horowitz, 44 East Twenty-third street, is company representative.

New York, N. Y.—The Winfield Paper Corporation has been incorporated with capital of 100 shares of stock, no par value, to deal in paper goods of various kinds. Clarence M. Davis, 342 Madison avenue, is incorporator and representative.

New York, N. Y.—The Sylvanic Company, Inc., has been chartered under direction of the Corporation Trust Company, 120 Broadway, New York, in Delaware, with capital of $300,000, and 2000 shares of stock, no par value, to manufacture and deal in paper and cellulose products. The incorporators include: William Ferguson and Irving G. Idler, New York, N. Y.

Detroit, Mich.—The Paper Sales Company of Detroit, Inc., 5300 Wabash avenue, has been chartered with capital of $25,000, to deal in paper products of various kinds. Anton Peck, 11042 East Warren avenue, is principal incorporator and representative.

New York, N. Y.—B. Weinkrantz Company, Inc., has been chartered with capital of $50,000 to deal in paper goods of various kinds. Harry J. Schuman, 1620 Ocean avenue, Brooklyn, N. Y., is principal incorporator.

Milwaukee, Wis.—Moulded Pulp Products, Inc., has been incorporated to manufacture and deal in pulp and paper products. Joseph Sabel is the principal incorporator. New company is represented by Waldemar C. Wehe, 606 West Wisconsin avenue, Milwaukee.

Chicago, Ill.—The Universal Blue Print Paper Company, Inc., 600 West Kinzie street, has been organized with 50 shares of stock, no par value, to deal in blue print and other special paper stocks. Principal incorporators are Guy Anderson and Walter L. Buxton.

Rochester, N. Y.—The International Play-Tex Company, Inc., has been incorporated with capital of 200 shares of stock, no par value, to manufacture and deal in latex products and affiliated specialties. The incorporators include Scott Stewart, Jr., and Carl F. Paul, Jr., 31 Exchange street, Rochester.

New York, N. Y.—The Federated Mills, Inc., has been incorporated with capital of $26,000, to manufacture and deal in paper products of various kinds. Irving S. Freedman, 120 Broadway, New York, is one of the incorporators.

New York, N. Y.—The Trojan Paper Company, Inc., has been chartered with capital of $20,000, to deal in paper goods of various kinds. The incorporators include: Ernestine Schlecker, 949 Faile street, and Sidney Shemel, 266 East Van Courtlandt avenue, both Bronx.

Bloomington, Ind.—The Bloomington Basket Company, Inc., 811 North Rogers street, has been incorporated with capital of $12,500 and 600 shares of stock, no par value, to manufacture paper containers of various kinds, including boxes, cartons, baskets and other specialties. George W. Talbot and Frank M. Talbot, Jr., are principal incorporators and heads.

Troy, N. Y.—The Eagle Mills Paper and Tablet Company, Inc., Troy, has been incorporated with capital of 100 shares of stock, no par value, to manufacture and deal in paper goods of various kinds. The incorporators are: Walter M. Weisberg and William A. Adams, 165 Broadway, New York, N. Y.

New York, N. Y.—Clark Brothers Paper & Twine, Inc., has been chartered with capital of 100 shares of stock, no par value, to deal in paper products of various kinds. The incorporators are: Norman Clark, 810 Dawson street, Bronx; and Silas Clark, 600 West 165th street, New York City.

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FUTURE MEETINGS

TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY, Summer International Meeting in Canada, August 3 to 7, Montreal, Quebec, The Saguenay. Details may be obtained from the secretary, R. G. Macdonald, 122 East 42nd street, New York.

NEW ENGLAND SECTION, Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Nonotuck Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION, Technical Association of the Pulp and Paper Industry—fourth Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION, Technical Association of the Pulp and Paper Industry—second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION, Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park-American Hotel, Kalamazoo, Mich.

AMERICAN PULP AND PAPER MILL SUPERINTENDENTS' ASSOCIATION, Annual convention, Grand Rapids, Mich., June 24-26, 1936.

NOTICEABLE EXPANSION CONTINUES TO BE SHOWN IN FOREIGN PAPER TRADE

The United States trade with foreign countries in paper and paper making materials during the month of January on the whole continued the advance which has been noticeable during the past two years or more, according to the Forest Products Division of the Department of Commerce.

Exports of paper and paper products from the United States during January reached an aggregate value of $1,822,198. This sum represents an increase of 10 per cent over the December total and is 17 per cent higher than the amount recorded for January 1935. Incidentally, it is higher than for any January since 1931. An encouraging feature is that nearly all classes contributed to this rise. Newsprint shipments, which were inclined to show a downward trend during the latter part of 1935, were 20 per cent higher than for the corresponding month last year. Approximately the same increase also took place in shipments of writing papers, while boards increased 25 per cent, the increase in exports of boxboards being sufficient to offset the decline in exports of bristols and other paper boards. Exports of wrapping and over issue news papers, which are extensively used in the Orient as a substitute for wrapping paper, were about the only items on the schedule to show substantial decreases. Shipments of the former declined nearly 70 per cent during January compared with January 1935, while shipments of the latter dropped off nearly 25 per cent.

Exports of paper base stocks also showed a considerable decrease in January compared with the corresponding month last year. Shipments of sulphite pulp, which account for the bulk of these exports, dropped off 40 per cent in volume. Shipments of rags and other waste for paper making increased 13 per cent and there was also a slight rise in shipments of soda pulp, but these items are relatively unimportant compared with sulphite pulp. Total exports of paper base stocks from the United States during January were valued at $538,349 as against $867,081 during the corresponding month in 1935.

Imports of newsprint during the month of January were considerably lighter than in December, but were more than 10 per cent above the January 1935 receipts in volume. The value of these importations did not show a corresponding increase, indicating the average price per ton of these entries was somewhat lower this year than a year ago. Imports of other classes of paper show an aggregate increase of more than 50 per cent in value, due largely to heavy increases in receipts of kraft wrapping paper, printing papers other than newsprint, and boards exclusive of pulp boards in rolls. Receipts of the last item were nearly 15 per cent under those recorded for January 1935. Imports of cigarette papers, which is an important item on this schedule, were 45 per cent higher than during last year.

Total imports of paper and paper products during January are valued at $7,280,172 as against $6,399,279 during January 1935. Newsprint paper valued at $6,180,665 represented 85 per cent of the January 1936 receipts as against 89 per cent during the corresponding month in 1935.

Imports of paper base stock were uniformly higher during January than during January 1935. Imports of pulpwood increased 20 per cent, rags 90 per cent, and other waste for paper making 68 per cent. Imports of wood pulp show an aggregate increase of 20 per cent in volume. Proportionately the heaviest gains occurred in imports of bleached sulphite, while imports of unbleached sulphite and kraft pulp made the least advance. Total receipts of paper base stocks during January were valued at $7,985,968 as against $6,825,349 during the corresponding month last year. This year's imports comprised: 209,145 tons of wood pulp valued at $7,262,348, 55,964 cords of pulpwood valued at $337,933 and 14,139 tons of rags and other waste valued at $385,687.

G. E. ORDERS GREATLY INCREASE

Orders received by the General Electric Company for the first quarter of 1936 amounted to $59,569,879, compared with $49,379,932 for the corresponding quarter of 1935, an increase of 21 per cent, President Gerard Swope announced recently. This was the largest quarter since the third quarter of 1931.

Chinese Government To Make Newsprint

The proposed paper mill at Wenchow, China, which has been under consideration by the Ministry of Industries for some time, is about to become a reality, according to a recent report from Vice Consul Julius Wadsworth, Shanghai. If the plan of the Chinese Government is adherred to, the mill will be in operation during the first part of 1937, with an initial output of 35 tons daily of newsprint, which will be produced from domestic stock. This project has been made possible by the employment of the revolving fund available from the British Boxer Indemnity Fund.

The Ministry of Industries has been studying the feasibility of constructing a government owned paper mill for the production of newsprint since the latter part of 1932. A committee of experts was sent by the Ministry to Chekiang Province to investigate the available resources for raw material and water power, and it was decided that the area near Wenchow, some 500 miles south of Shanghai, was best suited for such a mill. Ma Wen, about 20 miles from Wenchow, was chosen as the site of the mill inasmuch as it is located near the best timber supply, and is situated on the Ou-Kiang. Raw materials for the construction of the mill can be supplied at low cost from the neighborhood. An added advantage of the site is that a highway, of which there are as yet comparatively few in China, runs past the mill site.

Suitable timber for paper making is abundant in the surrounding districts. China fir is the principal variety of timber found in this region, with Liushan and pine coming next. The neighboring district of Lungshuan produces large amounts of timber.

The supply of timber in the neighboring district is reported to be ample to insure an adequate supply of pulpwood to the mill.

Hours and Wages After NRA

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., April 6, 1936—The so-called Robert report dealing with hour and wage provisions of the NRA, after that law became inoperative has just been made public. In connection with the compliance in the paper and pulp industry the report has the following to say:

"There was no detailed survey of labor standards conducted in this industry; information received indicates, however, that in certain localities hours have been increased to 48 per week, with straight time rates for overtime; also a small number of employees are reported to be receiving less than the code minimum, with learners and piece work employees not guaranteed the minimum wage.

"The trade practice questions asked relate to the open price system, quantity discounts, customer classifications, price adjustments and sales below cost. It will be seen from the summary tables that in only a comparatively small number of the industries surveyed (about one-third) were departures reported from any one of these trade practices. Assertion is made that selling below cost occurred in some degree under the code, and it is not clear that this practice has materially increased since May 27, 1935.

"On the whole, it appears that there have been departures from code standards in a moderate number of establishments since May 27, 1935. There are indications that in approximately two-thirds of the establishments surveyed there were no departures of any kind from code standards in the trade practices of the survey conducted."

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES

Month	1936	1935	1934
January	76.1%	65.8%	.....
February	78.0%	70.0%	.....
March	.....	70.5%	.....
April	.....	70.0%	.....
May	.....	69.4%	.....
June	.....	72.3%	.....
July (b)	.....	67.8%	.....
August	.....	70.9%	.....
September (c)	.....	75.0%	59.4%
October	.....	75.6%	64.7%
November	.....	75.3%	61.7%
December (a)	.....	74.3%	62.1%
Year	.....	71.2%	.....

COMPARATIVE WEEKLY SUMMARIES

CURRENT WEEKS, 1936		CORRESPONDING WEEKS, 1935	
*March 7	79.6%	March 9	69.6%
*March 14	78.9%	March 16	69.8%
*March 21	71.3%	March 23	70.8%
*March 28	73.5%	March 30	71.6%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting, Current Weeks			
Ratio Limits	March 7, 1936	March 14, 1936	March 21, 1936	March 28, 1936
0% to 50%	72	83	137	86
51% to 100%	261	249	193	150
Total Mills Reporting	333	332	330	236

* Subject to revision until all reports are received.
These data exclude (a)—Christmas Day, (b)—Fourth of July, (c)—Labor Day.

PAPERBOARD OPERATING RATIOS

According to reports from the National Paperboard Association, per cents of operation, based on "Inch-Hours," were as follows:

1934	1935	1935	1935	1936
Sept. ... 62%	Jan. .. 61%	May .61%	Sept. . 69%	Jan. .. 61%
Oct. ... 63%	Feb. . 67%	June . 65%	Oct. .. 76%	Feb. . 67%
Nov. ... 56%	Mar. . 67%	July .. 59%	Nov. . 70%	
Dec. (a) 53%	Apr. . 61%	Aug. . 65%	Dec. . 60%	

Week ending March 7, 1936—68% Week ending March 21, 1936—65%
Week ending March 14, 1936—67% Week ending March 28, 1936—65%

A New Specialty Paper

Dr. E. R. Weidlein, in making his annual report to the trustees of the Mellon Institute of Industrial Chemistry, University of Pittsburgh, Pittsburgh, Pa., has the following to say regarding a new specialty paper:

"The advantages of cooperative work between fellowships interested in entirely different fields is well illustrated by the development of a new specialty paper by P. B. Davidson on the Strathmore Paper Company's fellowship. Through the Mellon Institute system the Sugar Institute, Inc., had been seeking new uses for sugar and had devised a commercial method for the production of sucrose octacetate. The applications of this compound in paper technology were then studied by the Strathmore fellowship, which found it imparted to certain papers a mellow translucency that has suggested its use in greeting card stock or other kindred specialty papers where strength, pleasing texture, excellent printing properties, and translucency are important considerations. A specialty paper having these properties is now being considered for manufacture by the donor under U. S. patents 1,996,857 and 1,996,858."

Providence Paper Co. Elects Officers

[FROM OUR REGULAR CORRESPONDENT]

PROVIDENCE, R. I., April 6, 1936—New officers of the Providence Paper Company are: President, George H. Kerr; vice-presidents, Walter R. Dolliver and John R. Halkyard.

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Edited by Ronald G. Macdonald, Secretary

Pulp and Paper Industry Literature Review

Abstracts of Articles and Patents Compiled by the Abstracts and Bibliography Committee of the Technical Association of the Pulp and Paper Industry, A. Papineau-Couture, John F. Ohlson, C. E. Peterson and Clarence J. West, Chairman

Copies of United States Patents can be obtained from the United States Patent Office, Washington, D. C., for 10 cents each. Send currency, not stamps.

Bleaching

Notes on Hypochlorite Bleaching of Easy Bleaching Sulphite Pulp. James Strachan. Paper Maker & Brit. Paper Trade J. 90, No. 1:TS 97-98 (July, 1935).—A brief discussion of the evolution of sulphite bleaching processes and of present-day trends.—A. P. -C.

The Position of Pulp Bleaching During the Year 1934. Ladislav Rys and Alfred Bonish. Zellstoff Papier. 15, No. 3:94-95; No. 4:139-141 (March, April, 1935).—By means of references to the literature and patents, the authors give a brief synopsis of the various experiments and new methods used in the bleaching of pulp.—J. F. O.

Bleaching of Paper Pulp. O. Routala and Ingmar Jaatinen. Acta Chem. Fennica 7:96B (1934); C. A. 29: 5266.—Dark brown paper pulp can be bleached satisfactorily to a white sulphate pulp with chlorine and bleaching powder.—C. J. W.

Pulp Bleaching Process. John D. Rue assignor to Hooker Electrochemical Co. U. S. pat. 2,001,268 (May 14, 1935).—An amount of chlorine corresponding to from 20 to 100% in excess of that required for chlorination of the lignin is added to a flowing stream of the pulp and allowed to act for about 3 to 5 min. Sufficient alkali is then added to neutralize any acidity present and to convert all the residual chlorine into hypochlorite, and the mixture is allowed to react until the hypochorite is substantially exhausted.—A. P. -C.

Apparatus for Bleaching Pulp. Carl B. Thorne. U. S. pat. 2,008,603 (July 16, 1935).—In order to avoid hydration due to agitation, and at the same time prevent settling of the fibers, a mixture of low-density pulp and bleach liquor is flowed by gravity in a shallow layer, through a relatively long, downwardly inclined conduit. Mixers are provided at the inlet end and discharge regulators at the outlet end, the mixers and regulators being designed so as to avoid any substantial agitation of the pulp. —A. P. -C.

Means for Reacting Semifluid Materials. Paul Hooker, Thomas L. B. Lybster and John D. Rue assignors to Hooker Electrochemical Co. U. S. pat. 2,000,953 (May 14, 1935).—In order to obtain rapid and thorough mixing of chlorine with a paper pulp suspension, the chlorine is introduced into the stock as the latter is pumped through a pipe in which there is a fixed helix wound around a central shaft, and a number of straight longitudinal ribs and flat circular transverse baffle plates are provided inside the pipe to produce a transposition of the layers of liquid. —A. P. -C.

Dyes and Dyeing

The Mechanism of Dyeing Paper. Robert E. Rose and J. Carl Schmidt. Technical Association Papers 18: 442-445 (1935); Paper Trade J. 101, No. 5:37-39 (Aug. 1, 1935).—Paper coloring is shown to be more akin to lake making than textile dyeing. Use is made of the information that has accumulated regarding the mechanics of the dyeing processes of textiles and rayon in explaining the coloring of paper.—A. P. -C.

Recent Work and Experiences in the Dyeing of Paper. S. Pestalozzi. Zellstoff Papier 15, No. 2: 54-56, (Feb., 1935).—New dyes and mordants or fixing agents are described.—J. F. O.

Coating and Filling Materials

Paper Coating and Filling Composition. Leon H. Larson assignor to R. T. Vanderbilt Co., Inc. U. S. pat. 2,000,031 (May 7, 1935).—A dry mixture is formed of lime, alum and titanium dioxide in such proportions that a gelatinous precipitate is formed on admixture with water, which is rendered opaque by the dispersed titanium dioxide.—A. P. -C.

Mineral Material for Use in the Manufacture of Paper and the Like. Mead Corp., assignees of J. J. O'Connor. Brit. pat. 426,948 (Sept. 12, 1933).—A small quantity of a dispersing agent (*e.g.*, 1 per cent by weight of sodium silicate) is added to an aqueous suspension of china clay, and the mixture separated into two fractions by centrifuging. The fine fraction, which comprises 50 per cent of china clay, is then flocculated by addition of 0.75 per cent alum and filtered. The fine fraction, in admixture with casein, etc., is used as a coating agent, whilst the coarse fraction is used as a filler. The coating agent thus produced is claimed to give a higher finish than satin white and regular coating clay.—A. P. -C.

Factors Affecting the Determination of Water Vapor Permeability*

By Allen Abrams[1] and George J. Brabender[2]

Abstract

1. The permeability of sheet materials to water vapor is influenced by the vapor pressure differential on the two sides of the test sheet. However, it is here shown that, in the absence of definite measurements, it is unsafe to make assumptions as to what this differential may be.

2. Water vapor permeability is inversely proportional to the distance between the test sheet and the water surface in the testing equipment.

3. An initial seasoning period is necessary before a constant rate of water vapor transmission is established. This will be a matter of minutes with light, permeable papers while it may be a matter of days with heavy, moistureproof sheets.

4. At the present time it appears simplest to use an empirical method and equipment which will give results predicting what a sheet will do under service conditions. Among the points to be observed are standardization of dimensions, lightness, prevention of edge leakage, ratio of test sheet area to water area and the distance between the water surface and the test sample.

Recently moistureproofness has become of great importance in wrappers used for food stuffs, tobacco and other commodities where it is desired to maintain a uniform moisture content. Recognition of this fact has led to a study of equipment and methods for testing the penetration of water vapor through papers. Following are some of the contributions to the literature on this subject.

Harvey *(3)* fastens the sheet undergoing test to a metal frame having a damp felt inside. The assembly is kept in a tight chamber at constant temperature, with a drying agent outside the frame. After seasoning for one hour in the drying chamber the assembly is weighed, exposed for a period of 2½ to 5 hours, reweighed, and the loss is then calculated to grams per square inch per 24 hours.

Schumacher and Ferguson *(8)* describe an apparatus for measuring diffusion, embodying a mechanical clamp and a mercury cell. This equipment operates under low pressure, building up a high humidity on one side of the sheet and then measuring the water vapor diffusion through the sheet into the other chamber. The method snould be satisfactory for scientific work but would probably not lend itself to routine testing.

Hyden *(5)* seals the sheet over a glass dish containing water, then sets the combination in an oven at a controlled temperature of 100 deg. F. A fan blows air over trays containing concentrated sulphuric acid and then circulates this dry air over the test sheet. The loss in weight is calculated to milligrams per square meter per hour.

Thomas & Reboulet *(11)* have developed a method involving the use of a constant temperature cabinet. The sample undergoing test is clamped between brass flanges. Air, saturated with water vapor, is brought under slight pressure against the sample and the moisture passing through during a period of 2 hours exposure at 30 deg. C. is absorbed in a calcium chloride tube and weighed. The resultant increase of weight in the tube is a measure of the moistureproofness of the sheet. It would appear, however, that with highly moistureproof sheets, the weight of water vapor passing through the test sample is so small as to lessen the precision of the results.

Abrams and Chilson *(1)* have investigated the factors influencing methods for testing moistureproofness. Based on these results they have developed a method embodying the use of a light aluminum can, to the top of which the test sample is securely fastened. The assembly is weighed, placed before a fan in a room at constant temperature and humidity for a period of from 6 to 24 hours, reweighed, and the results calculated to "water vapor transmission rate in grams per 100 square inches per 24 hrs."

Staedel *(9)* gives a resume of many of the investigations which have been made previously and also repeated much of the work carried out by Abrams and Chilson. Staedel then proposed a method using a constant temperature-humidity cabinet. The test sample is stretched over a shallow aluminum pan having a wet felt within, although no details are given for the method of attaching the sample. The test pan may then be set in a controlled room or cabinet, a current of air is blown over the sample and the loss in weight at the end of 2 hours is used for determination of the moistureproofness.

Herrmann *(4)* describes a type of equipment and a method used in testing various sheeted materials. The sample is attached to an aluminum cell containing water. The cell is kept at constant temperature and the moisture diffusing through the sheet is taken up in a drying agent outside the cell. The loss in weight of the whole cell combination represents the amount of water which had diffused through. The results of Abrams and Chilson *(1)* would suggest that the lack of convection apparently associated with this method may give results differing considerably from those obtained where there is a suitable movement of air over the test sample.

Recent papers by Tressler and Evers *(12)* and by Charch and Scroggie *(2)* describe the effects of various factors on the determination of water vapor permeability. The method employed by these investigators consists essentially of sealing the test sample with beeswax on a glass crystallizing dish containing a measured amount of water. The assembly is made up by placing the test sample on a piece of cardboard, setting on the sample a crucible which contains a measured amount of water, dipping the edges of a crystallizing dish in melted beeswax then inverting the dish over the crucible and onto the test sheet. The sample is thus sealed to the edge of the dish, after which the entire assembly is quickly inverted so that the crucible is overturned and the water is spread on the bottom of the crystallizing dish. The entire assembly is weighed, placed in a current of air for a definite length of time, reweighed and the water vapor passing through the sheet is determined from the loss in weight of the assembly. The water vapor permeability of the test sheet is then calculated to convenient units.

The studies originally carried out by Abrams and Chilson *(1)* led to the development of a method for testing moistureproofness of papers involving the use of a spe-

* Presented at the Annual Meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y., February 17 to 20, 1936.

[1] Member TAPPI, Technical Director, Marathon Paper Mills Co.
[2] Member TAPPI, Chemical Engineer, Marathon Paper Mills Co.

cially designed aluminum can later known as the Vapometer. The equipment has since been used extensively in the authors', and many other laboratories with satisfactory results.

However, further work by one of the authors indicates that in the testing of sheets of low permeability there may be edge leakage in samples undergoing test, thereby introducing an appreciable error in the results. Charch and Scroggie *(2)* have pointed out the necessity for eliminating edge leakage, although these writers mention that the loss from this source is insignificant for most materials. While this statement is generally true for very thin sheet materials, our work indicates that there are many cases where edge leakage is appreciable. For example, sheet materials having a moistureproof coating on one side only will show a considerable edge leakage when tested with the non-moistureproofed side toward the atmosphere of high humidity. Laminated papers such as asphalt laminated papers and wax laminated glassine, where the moistureproof layer is interposed between two or more plies of cellulosic sheet material, will give high water vapor permeability results unless protected against edge leakage. The importance of edge leakage becomes greater as the thickness of the test sheet increases because of the larger area of the sheet exposed on the edges. Errors of 100 per cent or more may be expected when testing the permeability of materials such as those just described, unless the factor of edge leakage is considered. Recognizing the necessity for eliminating the error from edge leakage, the Vapometer has been redesigned as will be described later.

I. Testing Procedure

A. Principle

A study of this previous work leads to a formulation of the principles upon which a simple and precise method for testing moistureproofness may be developed.

1. The method should depend upon diffusion of water vapor from an atmosphere of high relative humidity to one of lower relative humidity for this is what happens when packaged goods either dry out or absorb moisture.

Obviously it must be possible to determine accurately the amount of moisture passing through a given area of the test sheet in a given time. The gravimetric method is simple and reliable.

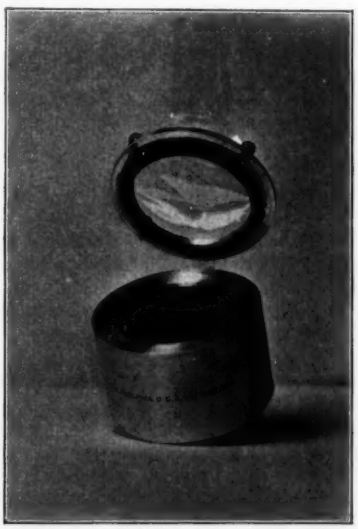

FIG. 1
New improved Vapometer.

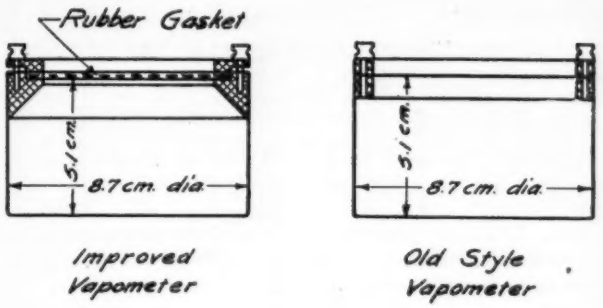

FIG. 2
Sketch of old and new style Vapometers.

2. The testing equipment itself should be simple, precise and duplicable. It should be so easily operated that different people may get the same results on the same paper. Some methods require a technique which is obtained only by long experience.

3. The method should give reproducible results and should predict what may be expected of a wrapper in actual service.

B. Equipment

The work described herein was all conducted in a well insulated and controlled room having facilities for controlling the temperature to ± 0.5 deg. C. and the relative humidity to ± 2 per cent. A recording wet and dry bulb thermometer was placed on the shelf near the Vapometers during each test. The wet bulb of the recording thermometer was ventilated at an air speed of 900 feet per min. (458 cm. per sec.). This recording thermometer was checked prior to its installation, and during this work, against a sling psychrometer having calibrated thermometers.

A controlled room with the recording apparatus as described is usually standard equipment in modern paper testing laboratories. When such equipment is available it does not become necessary to make a considerable outlay for controlled ovens or cabinets.

The accompanying photograph, Fig. 1, as well as the sketch, Fig. 2, will illustrate the design of the new Vapometer. The test sample it surrounded by an aluminum ring which is integral with the lower part of the instrument. Another separable ring having a rubber washer attached to the bottom is then clamped firmly against the sample so that danger of edge leakage is eliminated. The new type of instrument is assembled quickly and a series of tests may be carried out at one time by the use of the requisite number of cans. The old style Vapometer is also illustrated in the sketch shown in Fig. 2. Whenever it was used in the work to be described, the exact conditions of its use are also set forth.

Vapometers similar in construction to the new style shown in Fig. 2 but varying in height from 1.9 cm. to 7.6 cm. inside were used for the work shown in Fig. 7.

Short cylindrical vessels made of light weight sheet metal were used in obtaining the results shown in Fig. 8. The inside diameters of these vessels varied from 3.1 cm. to 8.3 cm.

Disks of Whatman's No. 1 filter paper were used in making the humidity measurements within the Vapometer.

Small stands made of 14-mesh brass screen 7.0 cm. diameter and of various heights were also used for these humidity measurements. The wire in the 14-mesh screen was 0.5 mm. diameter.

Papers tested:

a. Glassine—100 per cent bleached sulphite—20 pounds (24x36-500)
b. Dry waxed sulphite—35 pounds (24x36-480) waxed with 130-2 deg. F. m.p. paraffin wax to 45 pounds
c. Whatman's No. 1 filter paper
d. Moistureproof cellophane—300 gauge
e. Non-moistureproof cellulose acetate 19 pounds (24x36-500)
f. Pliofilm—0.001
g. Carton board—.018 waxed on one side only with 30 pounds of wax
h. Carton board—.032 waxed on both sides with 9 pounds of wax on each side.

C. Method

The following general procedure was used for determining water vapor permeability throughout this work except where otherwise indicated.

Fill the Vapometer to the 50-cc. mark, thereby allowing a distance of 4.3 cm. from the top of the water to the test sample. Cut a circular test sample of the proper size to fit the top of the Vapometer and fasten in place by turning down the thumb screws tightly. Place the assembly in a room maintained at 21 deg. C. and 50 per cent relative humidity. Set the can before an electric fan so as to maintain a circulation of air at a minimum velocity of 3.0 meters per second (600 feet per minute) over the test sheet.

Making a weighing of the assembly to 0.001 gram after the initial seasoning period has elapsed. (The length of this seasoning period will vary for different papers, as will be shown later in this report.) Make a final weighing of the assembly at least 16 hours after the period of constant rate of loss has begun. Calculate the loss in weight to water vapor permeability in grams per square meter per 24 hours.

Tests made with the old-style Vapometer followed the same general procedure just outlined. In those cases where edge leakage would have a bearing on the results obtained, the seams of the Vapometer and the edges of the sheet were sealed by brushing on a liberal coating of paraffin wax.

D. Units

Various units have been proposed for expressing the property of permeability of sheet materials and membranes to the passage of water vapor. Abrams and Chilson *(1)* originally proposed to express this quantity as "grams per 100 square inches per 24 hours." Its justification was based solely on the fact that for most sheet materials which were of commercial importance at the time this original work was carried out, the unit expressed water vapor permeability in whole numbers of very few digits. However, the advent of highly moistureproof sheet materials on a large scale into the field of commercial packaging has brought out the need for a more convenient unit of expressing water vapor permeability. Other units which have been proposed are:

a. grams per 100 square meters per hour
b. mg. per 100 sq. cm. per 24 hours and
c. grams per square meter per 24 hours

The choice of a particular unit will depend somewhat upon the type of equipment and conditions employed in making the test since the amount of water vapor passing through the sheet will be governed by these factors.

In the final analysis a unit should be chosen which will express the unit of permeability as a function of area, time, sheet thickness and which may even involve the vapor pressure differential between the two sides of the sheet. We have chosen to express permeability as a function of area and time only, but under certain conditions, it may be desirable to express the unit in terms which take into consideration the factor of sheet or film thickness. Again it may be desirable in the permeability unit to express the pressure differential between the two sides of the sheet during the test, although the exact measurement of this differential presents problems which are very difficult and, up to the present time, impractical for routine testing.

The authors have chosen the unit, "grams per square meter per 24 hours" to express water vapor permeability throughout this work. This unit will express the permeability in whole numbers for practically all commercial sheet materials used in packaging. Moreover, in the methods which appear to have received the widest acceptance, all measurements of the amount of moisture passing through the sheet are made in grams. The choice of 24 hours has the advantage of defining approximately the time required for making the test. The choice of the unit of area has been purely arbitrary except for the fact that permeability units become whole numbers by its use, as previously pointed out. Since most sheet materials are described as to thickness or caliper, this factor has not been included in the unit of permeability. The work to be described later in this paper will explain the reason for not including vapor pressure differential in the unit.

II. Effect of Various Factors on Water Vapor Permeability Tests

A. Vapor Pressure Differential

The earlier paper by Abrams and Chilson *(1)* indicated that the water vapor permeability was a linear function of the water vapor pressure differential between the two sides of the sheet undergoing test. Later work, however, showed that permeability results did not always show a definite relationship to the calculated vapor pressure differential. This lack of agreement was also noted by Charch and Scroggie *(2)* in their work on permeability determinations.

Since the foregoing results were predicated on an assumed 100 per cent humidity at the lower side of the sheet in the Vapometer the writers then decided that this lack of agreement between permeability and vapor pressure differential must be due to the existence of a relative humidity less than 100 per cent.

1. Determination of Relative Humidity Within the Vapometer.

A search for a suitable method for measuring the humidity within the Vapometer did not bring out methods which could be adapted to this use. Any method which depended upon the difference in temperature between wet and dry bulb thermometers or thermocouples could not be used because of the introduction of water vapor into the free space by the wet bulb itself.

The method developed by Rosecrans *(7)* which is based on the relationship between the thermal conductivity of air-water vapor mixtures and the absolute humidity of air was investigated also. The principle upon which this method was based at first seemed well suited to the application in question. Further study of a method proposed by Leeds and Northrup Co., Philadelphia, based on Rosecrans' apparatus, showed that it required a fairly uniform humidity within the Vapometer and a natural convection to maintain it. Since there was considerable doubt that such conditions actually prevailed in our equipment, the proposed method was abandoned. In addition changes in the Vapometer itself were required to adapt it to this use. Such changes probably would throw considerable doubt on the correctness of assuming that the humidity readings would then be the same as those existing in the unaltered Vapometer.

The method finally decided upon for determining the relative humidity within the Vapometer was based on the relationship between the moisture content of cellulosic materials and the relative humidity of the atmosphere in which such materials were placed. By placing disks of filter paper within the Vapometer, determining their moisture content after equilibrium had been established and

relating this moisture content to the relative humidity, the humidity within the Vapometer should be obtainable.

a. Percent Moisture vs. Equilibrium Humidity curves. Circular disks of Whatman's No. 1 filter paper 7 cm. diameter were placed in a series of desiccators having various relative humidities maintained by sulphuric acid solutions of the proper concentration *(13)*. The moisture equilibrium curve shown in Fig. 3 was obtained by making weighings on these filter papers until they had attained a constant weight. A similar curve (Fig. 3) was made for the glassine sheet used throughout this work. The sheets of filter paper and glassine were brought to the humidity existing within the desiccators in the same direction as that followed in the subsequent work with these papers. Therefore, the relationship between moisture content of the sheet and its equilibrium relative humidity should not be affected by any hysteresis due to difference in direction of approach.

b. Time Required for Filter Paper to Come to Moisture Equilibrium within the Vapometer.

The data obtained in making the curves shown in Fig. 3 indicated that considerable time was required before filter papers placed in an enclosed space came to moisture equilibrium with the atmosphere within that space. Therefore the tests to be described here were made to determine the minimum time required for filter papers to come to moisture equilibrium with the atmosphere inside the Vapometer.

Tests were made by placing a disk of filter paper, 7.0 cm. diameter on a wire stand at a height of 3.3 cm. above the water surface within the Vapometer. The Vapometers were assembled in the usual manner using glassine, cellulose acetate, or moistureproof cellophane, respectively, as test sheets. These particular sheets were chosen in order that the tests might be made with sheets covering a wide range of water vapor permeability. The moisture content of the filter paper disks was determined at two-hour intervals for the first eight hours, and again at the end of 24 hours by having a sufficient number of Vapometers on test so that one could be removed at the end of each two-hour period. These results are shown in Fig. 4.

Reference to Figs. 3 and 4 show that the humidity at the 3.3 cm. height within the Vapometer covered with moistureproof cellophane has built up to more than 97 per cent within the first 2 hours, and increases thereafter until its final value is practically 100 per cent. On the other hand, in the case where glassine has been used as a covering the humidity reaches an equilibrium very quickly and stays

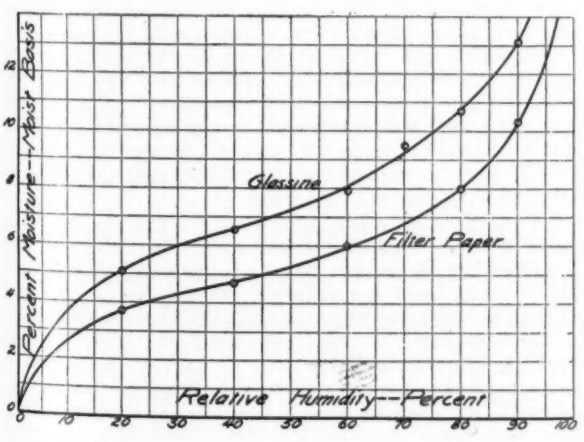

FIG. 3
Equilibrium moisture content vs. relative humidity.

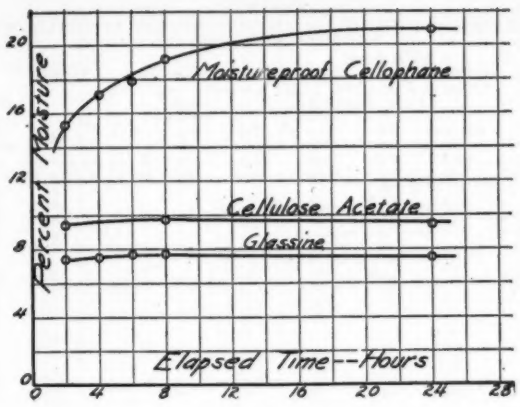

FIG. 4
Equilibrium moisture content of annular discs of filter paper interposed in the Vapometer between the water surface and three types of test sheets.

constant at about 78 per cent. With the cellulose acetate covering, the equilibrium humidity is also established rapidly and maintains itself at 88 per cent thereafter.

c. Relative Humidity Strata Within the Vapometer.

The following tests were made to determine the difference in humidity at various distances above the water in the Vapometer.

Annular disks of Whatman's No. 1 filter paper (7.0 cm. o. d. and 3.2 cm. i. d.) were placed on 14-mesh screen stands set inside the old-style Vapometers. Stands of varying height, namely 4.1, 2.6 and 1.3 cm. were used. The annular shaped disks were used in order to minimize any interference with natural convection which might occur if a full disk were used. The height of water in the bottom of the Vapometer was 0.8 cm. in each case, thus leaving the distances between the water surface and the filter paper disk as 3.3, 1.8 and 0.5 cm., respectively. The total distance between the water surface and the lower surface of the test sheet was 4.3 cm. in all of these tests. The Vapometers were assembled in the usual manner and placed on the shelf where they were ventilated at 21 deg. C. and 50 per cent or 65 per cent relative humidity respectively.

The Vapometer assemblies were made up using the following sheet materials in the normal position for making permeability tests:

a. No. 300 moistureproof cellophane.
b. Non-moistureproof cellulose acetate.
c. 20 lb. (24x36—500) glassine.
d. Whatman's No. 1 filter paper.

These particular sheets were chosen again to cover a wide range of water vapor permeability (W.V.P.).

The assemblies were removed after a period of 16 hours or more, the filter paper disks quickly removed and placed in a weighing bottle where they were weighed, dried at 105 deg. C., reweighed, and their moisture content calculated on the moist basis. The relative humidity at various heights above the water surface within the Vapometer was then determined by referring to Fig. 3. The data obtained are shown in Table I and graphically illustrated in the series of curves found in Fig. 5.

These data bring out several very interesting relationships. First, it is evident that the humidity within the testing instrument is considerably higher when a highly moistureproof sheet is being tested than when a sheet of relatively poor moistureproofness is under test. Second, the humidity inside the instrument is directly affected by the humidity which is maintained outside, the higher outside humidity producing a higher humidity inside. The relative humidity directly above the water surface is virtually 100 per cent, gradually decreasing at the higher levels to a

TABLE I
EQUILIBRIUM HUMIDITIES IN VAPOMETERS COVERED WITH VARIOUS TEST SHEETS

Kind of Sheet Tested	Filter Paper (7.0 cm. o. d. × 3.2 cm. i. d.) Distance above water (cm.)	Per cent Moisture	Equilibrium Humidity per cent	Test Sheet Per cent Moisture	Equilibrium Humidity per cent	W.V.P. g./sq. m. per 24 hr.	Temp. deg. C.	Relative Humidity per cent
Moisture-proof	3.3	19.8	98	...	..	....	21	50
	1.8	21.8	99	...	..	....	21	50
Cellophane	0.5	25.2	100	...	..	....	21	50
300 gauge	None	...	..	...	..	6.5	21	50
	None	...	..	...	..	2.9	21	50
Cellulose	3.3	11.6	93	...	..	197	21	50
Acetate	1.8	14.6	97	...	..	195	21	50
Non-mois-	3.3	9.6	88	...	..	....	21	50
tureproof	1.8	11.8	94	...	..	....	21	50
	None	...	..	...	..	226	21	50
Glassine	3.3	7.6	77	...	..	....	21	50
20 lb.	1.8	10.6	90	..	..	....	21	50
(24x36-500)	3.3	8.7	84	...	..	360	21	50
	1.8	11.7	93	...	..	352	21	50
	0.5	14.1	..	...	..	....	21	50
	None	...	..	...	..	516	21	50
Filter Paper	3.7	5.9	60	...	..	....	21	50
Whatman's	2.1	7.8	79	...	..	....	21	50
No. 1	0.8	9.6	88	...	..	....	21	50
	None	...	..	5.6	55	....	21	50
	None	...	..	...	..	1032	21	50
Cellulose	3.3	10.9	91	...	..	161	21	65
Acetate	1.8	13.7	96	...	..	164	21	65
Non-Moistureproof								
Glassine	3.3	9.3	86	10.5	79	282	21	65
20 lb.	1.8	11.8	93	10.4	78	....	21	65
(24x36-500)								
Filter Paper	3.3	8.8	84	7.3	75	331	21	65
Whatman's	1.8	11.3	92	7.5	76	....	21	65
No. 1								

value which is directly dependent upon the water vapor permeability of the test sheet.

The relative humidity existing directly beneath the surface of the test sheet was determined by extrapolation of the curves shown in Fig. 5. A few tests were made of the equilibrium humidity of the test sheet itself (taken directly from the Vapometer) and it was found that this humidity was the same as that found directly beneath the sheet. This finding is somewhat unexpected since it appears more reasonable that the equilibrium humidity of the test sheet should be at some point nearly midway between that existing on the two opposite faces of the sheet.

Taylor, Herrman and Kemp *(10)* mention, in their work on the diffusion of moisture through organic substances, that materials which have a tendency to absorb moisture have a non-linear concentration gradient through their thickness. They also state that such materials have a tendency to retain moisture. The work of these investi-

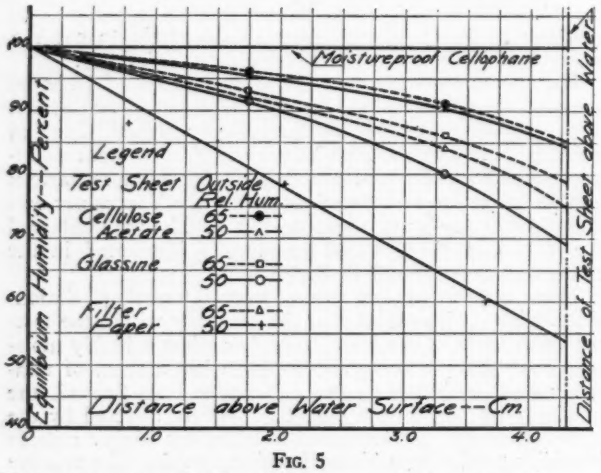

FIG. 5
Distance between annular disc of filter paper and the water surface vs. equilibrium humidity at the position of the disc.

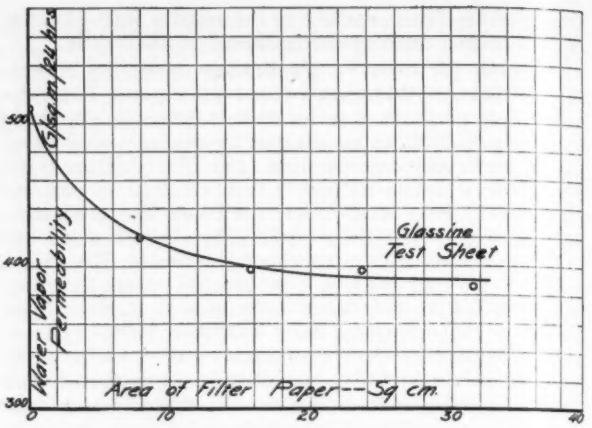

FIG. 6
Effect on water vapor permeability of interposing annular discs of filter paper of various areas in the Vapometer between the water surface and test sheet.

gators may serve to throw some light on the results described in the preceding paragraph.

A recent method by Zink *(14)* employing a magnet to operate a fan within a small enclosed space appears worth investigation in connection with further studies on the humidity existing within instruments used for making permeability tests.

B. The Effect on W.V.P. of the Presence of Objects Within the Vapometer.

The work of determining the relative humidities existing at different levels within the Vapometer soon led to the discovery that the presence of the filter paper gave lower results for water vapor permeability. These low results were suspected of being caused by the decrease in effective cross sectional area within the Vapometer because the stand made of 14-mesh screen had an appreciable area itself. Tests were then made at 21 deg. C. and 50 per cent relative humidity outside, using a glassine covering on the Vapometer. These confirmed our belief, since they gave a W.V.P. of only 396 with the stand in the Vapometer, as compared to 500 when there was nothing interposed between the water surface and the sheet covering the Vapometer.

This test was repeated using a skeleton stand having an area in a horizontal plane of less than 1 per cent that of the water surface. Placing this stand only within the Vapometer produced no effect on the W.V.P. of the glassine test sheet. However, a 7.0 cm. diameter disk of filter paper on this stand was found to reduce the W.V.P. about 25 per cent, showing that the presence of any object having an appreciable area within the Vapometer had a marked effect on the determination of permeability. Hence tests were made to determine the relation between permeability and the area of the filter paper interposed between the water surface and the test sheet.

Annual discs of filter paper were placed on skeleton stands at a distance of 3.4 cm. above the water surface. The filter papers used in this work were all 7.0 cm. outside diameter, and the different areas were obtained by cutting circular areas of various diameters from the center of these papers to make annular discs. The results obtained, (Fig. 6) indicate that the W.V.P. decreases as the area of filter paper interposed between the water surface and test sheet increases. Since the function is not a linear one, there is evidently some other factor besides a simple reduction in cross-sectional area which produces this result.

This lowering of the W.V.P. by the presence of a filter paper within the Vapometer very probably has had an influence on the results in the series of curves shown in Fig. 5. The lower W.V.P. can be interpreted as being caused by a decrease in the effective vapor pressure differential between the two sides of the sheet. Therefore, it is reasonable to expect that, in an actual test where nothing is interposed between the water surface and the test sheet surface, the humidities at the various levels within the Vapometer differ from those which exist in a Vapometer having some object interposed between the water surface and the test sheet.

The 14-mesh wire stands had an actual area in a horizontal plane of 21.6 sq. cm. The inside cross-sectional area of the lower part of the Vapometer is 59.5 sq. cm., which is the same as the area of the water surface. A reduction in W.V.P. of roughly 20 per cent was noted in the case of a glassine test sheet where the cross-sectional area had been reduced 36 per cent by the wire stand.

These results, together with those shown in Fig. 6, lead to the conclusion that there is no simple relationship between the apparent reduction in cross-sectional area of the test instrument and the lower W.V.P. resulting from interposing objects between the water surface and the test sheet. It becomes evident that this effect is one of interference with the normal convection taking place between the water surface and the sheet surface within the test instrument. Since this effect is of appreciable magnitude, especially with sheets of relatively poor moistureproofness, it must be given proper consideration in the design of a test instrument and in the specifications for a testing procedure.

C. Effect of Distance Between Water Surface and Test Sheet.

Some investigators *(3) (9)* have made use of very shallow pans having a wet felt inside, near the under surface of the test sheet. The purpose of adopting equipment of this type is evidently to maintain 100 per cent relative humidity directly beneath the test sheet.

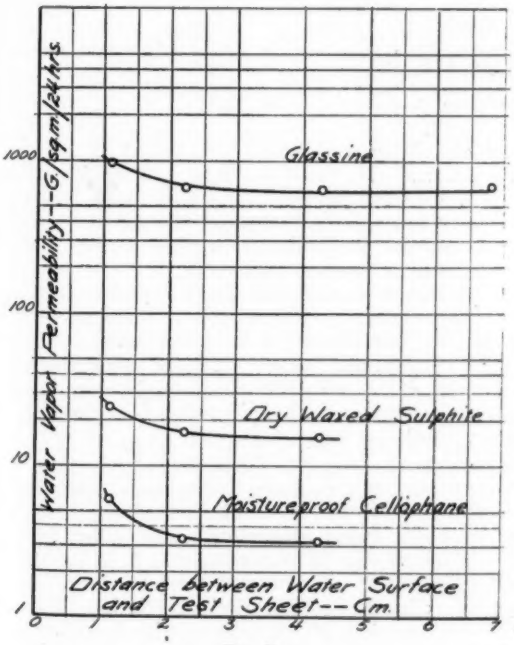

Fig. 7

Water vapor permeability vs. distance between water surface and test sheet.

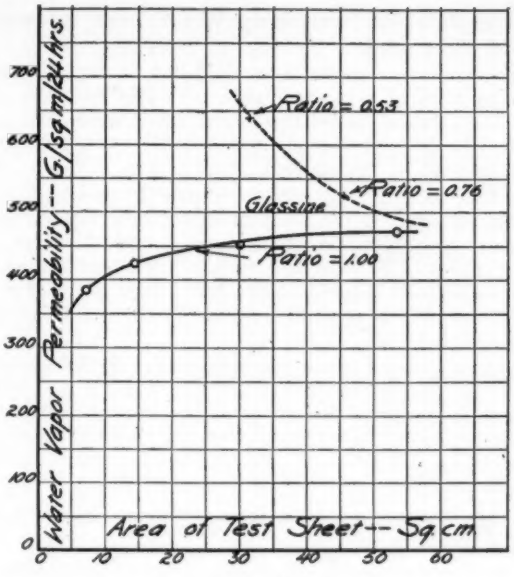

Fig. 8

Water vapor permeability vs. (1) area of test sheet, (2) ratio area of test sheet to area of water.

The writers have therefore investigated the effect on the W.V.P. of the distance between the water surface and the test sheet. These tests were made on sheets of glassine by employing Vapometers of the new style illustrated in Fig. 1. These were identical in all respects with the exception of height.

The results obtained (Fig. 7) confirm the findings of Charch and Scroggie *(2)*, that with decreasing distance between the water surface and sheet surface the W.V.P. increases. An interesting fact brought out by these tests is that at a distance of 1.0 cm. there is an increase of about 10 per cent in W. V. P. for a change in distance of only 1 mm. This effect of distance from the water surface becomes still greater as the distance is decreased to values less than 1.0 cm. It is evident that any attempt to bring the sheet surface to a point very near the water surface must be made with due regard to the necessity of insuring that all measurements are made with extreme precision if check results are expected. On the other hand, at distances in excess of 4.0 cm. the effect of slight changes in distance is very small.

D. Effect of Area of Test Sheet on the W.V.P.

Normally, one would not expect the W.V.P. to be influenced by the size of test sheet as long as a fairly representative sample was chosen. However, this question was brought to the attention of the writers, and a series of tests were made at 21 deg. C. and 50 per cent relative humidity, using specially constructed Vapometers of different areas. The instruments consisted simply of short cylinders made of sheet metal and having a top opening of the same area as the water surface in the bottom. All of these cylinders were 5.1 cm. high and the distance between the water surface and the sheet surface was maintained at 4.3 cm. in each case. Sheets of glassine were sealed over the openings by dipping the cylinders in beeswax to a depth of about 0.5 cm. and then sealing the sheets to the waxed edge with a warm flat iron. More melted wax was brushed beneath and on the edges of the sheet after it was trimmed to within about 0.3 cm. of the edge of the cylinder, but care was taken that the test area was not reduced. A good seal was obtained by this method. The

usual method for determining W.V.P. was followed in making these tests.

The results are shown as a solid line in Fig. 8, "ratio" meaning area of test sheet/area of water surface. The W.V.P. is found to be low when small sheet areas are tested, but little further change is noted when an area of more than 40 sq. cm. is used.

At first thought, this difference may be assigned to the normal variation in the samples themselves. These results, however, are quite consistent, form a smooth curve, and are averages of at least two tests in each case. These circumstances lend support to the belief that the results are not attributable to normal variation in the permeability of the sheet material.

Evidently, here again the side walls of the container affect the normal convection of the water vapor within the test instrument. The effect of the stagnant film which apparently exists along the side walls becomes more pronounced as the ratio of wall surface to cross sectional area increases.

E. The Effect of the Ratio "Test Sheet Area/Water Surface Area" on W.V.P.

It has been generally believed that the ratio between the area of the test sheet and the area of the water surface in the Vapometer might have an influence on the permeability results. Tests made with the new style Vapometer, which has a water surface area considerably larger than the area of test sheet, always gave much higher results than similar tests made with the old-style instrument. This was especially true when testing a sheet of poor moistureproofness such as glassine. In order to determine if these results were due to a difference in the ratio of sheet area to water area comparisons were made of tests using the new style Vapometer, the old style Vapometer and the cylinders described in the preceding chapter. The ratio of sheet area to water surface area in these instruments was 0.53, 0.76 and 1.00, respectively. In each case glassine was used as the test sheet, the test was made at 21 deg. and 50 per cent relative humidity, and the distance between sheet surface and water surface was kept at 4.3 cm.

The dotted line in Fig. 8 shows that with a decreasing ratio of sheet area to water area the W.V.P. increases. It seems quite logical to conclude that, with a decreasing ratio of test sheet area to water area, the humidity within the test instrument will build up to a higher value. Therefore, the vapor pressure differential will increase, giving a corresponding increase in the W.V.P., but at some sacrifice in precision of results due to the smaller area of sheet exposed to the test.

F. Effect of the Equilibrium Relative Humidity of the Aqueous Solution Within the Vapometer.

There seemed to be a possibility of simplifying the testing procedure by the use of constant humidity aqueous salt solutions. For example, where an outside humidity within the range of 20 to 70 per cent exists and where the equilibrium humidities of the salt solutions within two Vapometers are 20 and 70 per cent respectively, the equipment having the 20 per cent humidity solution should gain in weight due to absorption of water vapor while the other should decrease in weight due to loss of water vapor. Theoretically, the sum of the water vapor permeabilities, calculated from the change in weight of these two instruments, should be equal to that obtained in a test made at the same temperature but using an outside humidity of 50 per cent and water (at an apparent 100 per cent relative humidity) inside the Vapometer. By proper consideration of the algebraic signs, the theory would be sound even if the outside humidity were at some value outside of the range of 20 to 70 per cent. This theory further assumed that errors arising from humidity gradients within the Vapometer would be counterbalancing, thus giving an effective vapor pressure differential equal to that obtaining when the standard conditions of 50 per cent outside relative humidity and 21 deg. C. were maintained. If such a procedure could be used the necessity for having a constant humidity chamber in which to conduct permeability tests could be eliminated. This procedure does not take into consideration the errors which might arise due to the lag of the atmosphere within the Vapometers in responding to fluctuations in outside humidity. It is probable that such errors alone would have invalidated the proposed method, but the results which were obtained later in this study show that the method is impractical even when conducted in an atmosphere of controlled humidity.

We have also observed that when tests are made with highly moistureproof sheets there is a tendency for water to condense on the under surface of the sample. While the actual use conditions of the sheet may cause similar condensation it seemed desirable to make tests where any effect on the sheet structure due to the pressure of liquid water would be eliminated. Therefore, a series of tests was made in the Vapometers using saturated salt solutions having a range of relative humidities from 0 to 100 per cent.

The saturated salt solutions used, together with their equilibrium relative humidities at 21 deg. C., will be found in Table II. These data were obtained from the International Critical Tables *(6)*. These tests were all conducted at 21 deg. C. and 50 per cent outside relative humidity. The papers used were those described under "Equipment" including: (a) glassine, (b) dry-waxed sulphite, (c) one-side-waxed .018 board, and (d) moistureproof cellophane, thus providing a series ranging in W.V.P. from about 5 to 500, as determined by the authors' method employing water within the Vapometer.

TABLE II

EQUILIBRIUM RELATIVE HUMIDITY OF SATURATED SALT SOLUTIONS AT 21 DEG. C.

Salt	Formula	Humidity Per cent
Sulphuric Acid	H_2SO_4	0
Potassium Acetate	CH_3COOK	20
Calcium Chloride	$CaCl_2.6H_2O$	32
Sodium Dichromate	$Na_2Cr_2O_7.2H_2O$	52
Magnesium Acetate	$(CH_3COO)_2Mg.4H_2O$	65
Ammonium Sulphate	$(NH_4)_2SO_4$	81
Potassium Chromate	K_2CrO_4	88

The one-side-waxed board was tested in such a way that the waxed side faced the inside of the Vapometer in all cases. All of these tests were made with the old style Vapometer, but vapor loss through the edges or seams was insured against by sealing all possible sources of leakage with melted wax brushed over them.

All of these tests were run for a period of 24 hours or longer and triplicate check tests were made in every case. The W.V.P. was calculated from the data obtained after the rate of loss had become constant. This was done in order to eliminate any error which might arise during the initial seasoning period as pointed out in the succeeding chapter.

These results (Fig. 9) show consistently that for the same apparent vapor pressure differential the W.V.P. is always lower when the Vapometer assembly gains in weight (due to water vapor absorption) than when it loses in weight (due to loss in water vapor). It is interesting to observe that, with concentrated sulphuric acid inside the Vapometer, having an equilibrium relative humidity of 0 per cent, and with 50 per cent relative humidity outside, the W.V.P. is considerably less in all cases than when water is used inside and a 50 per cent relative humidity is main-

tained outside. It is obvious that the W.V.P. in these two instances would be opposite in sign.

Here is a case where the apparent vapor pressure differentials are equal, but in the one instance the W.V.P. is considerably higher than the other. The explanation no doubt lies in the discrepancy which arises from assuming that the humidity directly beneath the sheet surface is the same as the equilibrium relative humidity of the solution within the Vapometer. The series of curves shown in Fig. 5 lends support to this explanation. The results for the highly moistureproof sheets such as the cellophane and waxed board are somewhat erratic due to the difficulty of obtaining samples having exactly the same moistureproofness; likewise the precision of the results becomes considerably less when working with such materials. However, the same general trend is shown in these cases also.

These studies point out the advantage of using either water or a solution of high humidity within the testing instrument instead of using a desiccant. In the latter case the precision of results is seen to be lower and there is the possibility of a changing equilibrium humidity of the desiccant due to absorption of water.

The foregoing results lead the authors to reiterate the belief that the water vapor permeability is directly proportional to the actual water vapor pressure differential across the two faces of the sheet. The difficulty in obtaining evidence to support such a statement lies in the establishment of definite relative humidities directly at the two opposite faces of the sheet; or the corollary of this condition, the precise measurement of the relative humidities existing at the two faces of the sheet.

G. Length of the Seasoning Period.

It is evident that when a cellulosic material is to be tested by a method such as that previously described, there will be a period of seasoning during which time the test sheet will be setting up a mechanism for uniform transfer of water vapor. The length of the initial period required before the rate of water vapor transfer through the sheet becomes constant has been discussed by Abrams and Chilson *(1)*; also by Tressler and Evers *(12)*. The latter have shown that, in some cases, waxed board may require an initial seasoning period of as long as 96 hours before a constant rate of transfer is set up. They also recommend an initial period of 24 hours for transparent moistureproof sheet materials. However, the description of their testing method does not mention any precautions taken against the absorption of moisture through the exposed edge of the sheet.

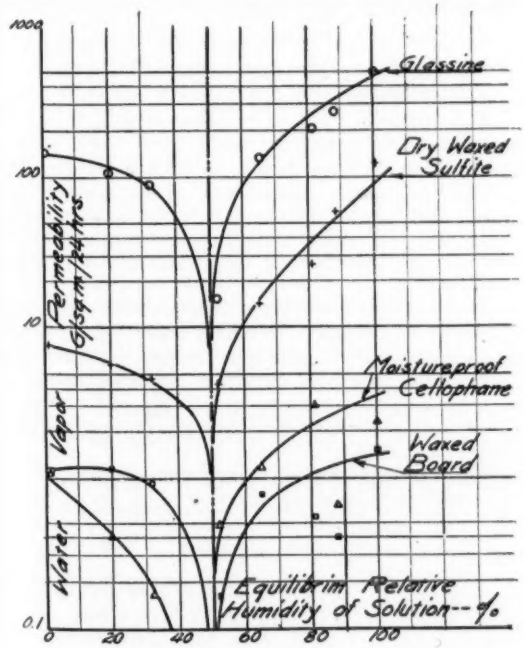

Fig. 9
Water vapor permeability vs. equilibrium humidity of solutions used in Vapometer.

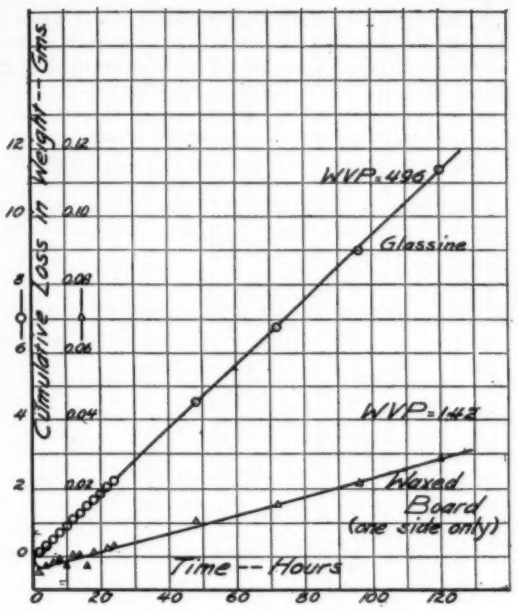

Fig. 10
Time of exposure vs. cumulative loss in weight.

In our earlier studies (Fig. 4) we have shown that with sheets of widely varying W.V.P., the humidity in the Vapometer apparently builds up to within 2 or 3 per cent of its final constant value in a period of 4 hours. If this were the only factor involved, we might then expect the rate of water vapor transmission to become constant in an equal period. However, a series of tests was run on different papers at 21 deg. C. and 50 per cent relative humidity to determine the length of this seasoning period. All of these tests were made in the old style Vapometers, but precautions were taken to insure against either edge leakage through the sheet, or mechanical leakage through the seams by brushing a liberal coating of wax on these places after the assemblies had been made up. Each test was made in triplicate. The following sheets were used in this series: (a) glassine, (b) dry waxed sulphite, (c) one-side-wax-coated .018 board, (d) moistureproof cellophane, (e) Pliofilm, and (f) two-side-waxed .032 board. The .032 board last described was also tested without having its edges sealed.

The results obtained in this series of tests are shown in Tables III and IV and in Fig. 10. A study of these figures shows that the mechanism of water vapor transfer through different sheet materials is set up only after a certain initial seasoning period has elapsed. The length of this seasoning period very likely depends upon the temperature and humidity conditions under which the test is carried out, and principally upon the nature of the sheet material itself. For example, glassine which has a poor moistureproofness attains the period of constant rate of water vapor

transfer through the sheet almost immediately after it is put on test. A dry waxed sheet having a fair moisture-proofness also attains the constant rate period within about two hours. Coming to the highly moistureproof cellulosic sheet materials such as cellophane, it is shown that the Vapometer assembly gave somewhat erratic gains and losses for a considerable time before the constant rate period was established. On the other hand, Pliofilm, which is a non-cellulosic moistureproof transparent sheet material having practically no affinity for water vapor, attains its constant rate period much sooner.

TABLE III
CUMULATIVE WEIGHT LOSSES OF VAPOMETER ASSEMBLIES FOR VARIOUS SHEET MATERIALS

Time from Start of Test, hours	Glassine, 20 pounds (24x36—500)	Dry Waxed Sulphite, 45 pounds (24x36—480)	.018 Board waxed on one side with 50 pounds wax	Moistureproof Cellophane, 300 gauge	0.001 Pliofilm	.032 Board waxed on both sides: Edges sealed	.032 Board waxed on both sides: Edges not sealed
2	0.184	0.029	+0.005	+0.002	+0.002	.....	.....
4	0.367	0.070	+0.003	+0.002	0.000	.....	.....
6	0.544	0.112	+0.002	+0.002	0.002	.....	.....
8	0.729	0.153	+0.001	0.000	0.003	.....	.....
10	0.948	0.202	+0.003	+0.003	0.003	.....	.....
12	1.137	0.248	0.000	0.003	0.008	.....	.....
14	1.307	0.287	0.000	0.003	0.008	.....	.....
16	1.521	0.328	+0.003	0.000	0.008	.....	.....
18	1.695	0.373	0.001	0.004	0.012	.....	.....
20	1.890	0.419	0.002	0.006	0.014	.....	.....
22	2.070	0.458	0.002	0.006	0.015	.....	.....
24	2.245	0.500	0.003	0.007	0.017	+.003	+.015
48	4.511	1.018	0.010	0.022	0.034	+.004	+.016
72	6.757	1.555	0.015	0.035	0.046	.....	.....
96	8.984	2.085	0.021	0.056	0.065	+.004	+.013
120	11.364	2.619	0.028	0.073	0.080	+.005	+.008
168	....	....	....	....	....	+.005	—.002
192	....	....	....	....	....	+.007	—.007
216	....	....	....	....	....	+.005	—.017
264	....	....	....	....	....	+.003	—.031
288	....	....	....	....	....	.000	—.041

When heavy materials such as carbon board are considered, the length of the initial seasoning period becomes increasingly important in making permeability tests. This fact was pointed out by Tressler and Evers *(12)* in a similar investigation. Our results on carton board moisture-proofed by waxing check those obtained by these investigators reasonably well.

The .018 board waxed on one side only and tested with the waxed side facing the inside of the Vapometer showed a fairly steady gain in weight until the end of the seasoning period after which the normal rate of transfer of water vapor took place through the sheet. The time required to attain the period of constant loss was somewhat less than 20 hours. On the other hand, the .032 board waxed on both sides required a period of 192 hours before the rate of loss became constant. This same board, tested without having its edges sealed against edge leakage, required a period of 96 hours to attain a constant rate of loss. The importance of protecting against edge leakage will be seen by comparing the results for the .032 board, a W.V.P. of 0.4 being obtained when the edges were sealed and 1.5 when they were not.

The results presented here will explain the difficulty in drawing up a specification for the length of the seasoning period. It may be suggested that the seasoning time be determined for each type of sheet material and that this initial period be given consideration when making a W.V.P. test. In case of doubt as to the seasoning time, it would be advisable to check the result obtained for W.V.P. over an additional 24-hour period or until a uniform rate of moisture loss has been established.

H. Comparison of old and New Style Vapometers.

The writers have realized for some time that the old style Vapometer was subject to mechanical leakage of water vapor at its seams and between the separable ring and the test sheet. The tests to be described were made to determine the actual amount of leakage occurring in the old style Vapometer at these vulnerable places. A further purpose of these tests was to determine the effectiveness of wax in sealing the old-style Vapometer. Finally, comparisons of results obtained with the old and with the new style improved instruments were made.

Tests were made on the old style Vapometer using 0.001 metal foil as the test sheet, both before and after sealing, with wax, the Vapometer at the seams and the juncture of the sheet and the separable ring. The results are shown in Table IV.

TABLE IV
COMPARISON OF W.V.P. USING OLD AND NEW STYLE VAPOMETERS

Old Style Vapometer		New Style Vapometer	
W.V.P. of Heavy Metal Foil		W.V.P. of	
Edges and seams not sealed	Completely sealed with wax	Heavy metal foil no additional sealing	0.025 cm. Copper Sheet
Ave. 15 tests	Ave. 6 tests	Ave. 6 tests	Ave. 2 tests
22.8	0.7	0.3	0.0 *

* Corrected for variations due to changing barometric pressure.

It is evident that the old style Vapometer was unsatisfactory unless the seams and edges were sealed with wax at the start of the test. The W.V.P. of the 0.001 metal foil determined with the old style Vapometer is probably somewhat high even in those tests where a wax seal was made because of the difficulty in completely sealing the screw holes which were drilled all the way through the inner ring of that instrument.

Further tests made on 0.001 metal foil with the new style Vapometer for periods of 3 to 11 days are shown in Table IV. These results indicate that the W.V.P. of this sheet is actually 0.3 g. The new Vapometers were tested for mechanical leakage by replacing the test sample with a sheet of 0.010 copper and conducting a regular W.V.P. test. The loss in weight found after continuing this test for 12 days was 0.000g. (Table IV).

III. Discussion of Results

These studies were originally undertaken with the purpose in mind of obtaining data which could be used in simplifying the procedure to be followed in making measurements of water vapor permeability of sheet materials. It became increasingly evident as this work progressed that the factors to be considered in making permeability measurements were quite numerous. Therefore, subsequent work was directed toward determining the most important factors having a bearing on this test and the extent of their influence.

A review of these results will show that any method for determining permeability which depends upon the use of an instrument similar in type to the Vapometer must take into consideration the factors enumerated below:

a. The relative humidity existing within the instrument.
b. The presence of objects within the instrument during a test.
c. Area of sheet exposed and the ratio of this area to that of the solution within the instrument.
d. Height of the test sheet above the liquid surface within the instrument.
e. Nature of the sheet material and the time required for seasoning before a constant rate of water vapor transfer is set up.
f. The magnitude of losses which may occur through edge leakage.
g. Mechanical leakage in the testing instrument.
h. The temperature and humidity conditions prevailing during the test and the precision of the measurements.

The authors fully appreciate the advisability of setting up specifications for a testing procedure based solely on fundamental principles. With a procedure of this kind, measurements of a physical property could be made with easily available equipment in almost any laboratory. However, the routine measurement of water vapor permeability

appears to be incapable of simple adaptation to such a procedure and it is difficult to see how any but an empirical method can be selected. Under such circumstances it appears that the advisable course would be to set up some empirical method which recognizes the influence of the various factors enumerated above.

At the present time our method consists in using an instrument of standardized dimension attaching the test sample at a height of 4.3 cm. above the water. The assembly is then allowed to season in a room at 50 per cent relative humidity and 21 deg. C. for a time, dependent on what experience has shown necessary for the sample undergoing test. The assembly is weighed, using a tare weight of approximately the same volume as the Vapometer in order to compensate for errors which might arise due to changing barometric pressure, as pointed out by Charch and Scroggie *(2)*. It is then placed before a fan producing a minimum air velocity of 3 meters per second. At the end of from 16 to 24 hours the assembly is reweighed and the result is calculated to water vapor permeability as grams per square meter per 24 hours at 50 per cent relative humidity and 21 deg. C.

Acknowledgment

The writers are indebted to the following members of the Marathon Paper Mills Company laboratory staff for assistance in preparing and carrying out many of the tests described in this paper: A. E. Gruening, C. L. Wagner, R. N. Hollands, D. E. Oatman and H. E. Cooper. The Thwing Instrument Company has extended its co-operation in the preparation of special Vapometers and in designing the new, improved style of Vapometer.

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The Characteristics of Power Requirements for Paper Machines*

By H. W. Rogers[1]

Abstract

An analysis of the power requirements of the various parts of the paper machine of various widths and speeds with comments on the influence of certain variables such as suction box, vacuum, water indriers, torque, etc.

The development of the sectional electric drive made it possible to thoroughly analyze a paper machine in its various elements, both as to power requirements and actual operating conditions. It resulted in a definite knowledge of "draw" conditions for various grades of paper and the influence these grades of paper had on the power requirements.

The sectional electric drive was naturally much more sensitive than any form of mechanical drive and clearly indicated what was taking place. It permitted the operator to study the laws of cause and effect, to trace difficulties to their real source, and undoubtedly has had a marked bearing on paper machine developments during the past decade. The gradual improvement of the sectional electric drive in flexibility, control and speed regulation to a point beyond the possibilities of any mechanical system were due in part to the electrical manufacturers but perhaps more to the desire of the paper manufacturer to improve his product and realize the full possibilities of the electric drive.

Since 1920, there has been an enormous accumulation of segregated data on power requirements of all types and sizes of machines running at all speeds on practically every kind of paper and these data have been very carefully analyzed and plotted in curve form for the benefit of those who are interested in the design of electric drives and the power requirements of paper machines.

It has generally been considered that the paper machine has a constant torque requirement, that is, power required is directly proportional to the speed. This is true of all sections, except the couch, calender and reel sections and it is also true that the power requirements vary directly with the width of the machine on all sections.

The Wire Section

On the couch or wire section the actual friction load of a properly aligned unit is very low, approximately 0.00014 hp. per inch width per foot speed, and the use of a suction couch roll does not cause any increase in power demand, if the suction box is properly adjusted. The suction on this roll should be sealed with a water film which is a good lubricant, but if the box is screwed up too high, this water is destroyed resulting in a high friction load, increased power consumption and possible trouble from other sources.

The greater portion of the power demand of the couch results from the suction boxes on the wire, which are a 100 per cent friction drag. The amount of suction held on these boxes varies with the kind of paper being made, the freeness of the stock and the speed. Generally speaking the power constant for the couch increases with the speed, the maximum occurring on high speed machines. Notable exceptions to this are found on machines making glassine and bond papers which have high power constants, i.e., 0.00075 hp. per inch width per foot speed, regardless of the speed at which paper is being made, because they are made from "slow stock" which does not give up water freely and consequently require high vacuums.

* Presented at the annual meeting of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria Hotel, New York, N. Y. February 17 to 20, 1936. Contribution of the Power and Lighting Subcommittee of the Heat and Power Committee.
[1] Member TAPPI, Industrial Engineering Department, General Electric Corporation, Schenectady, N. Y.

These peculiar characteristics of the couch are clearly shown in Fig. 1, the curved line being the average of a large number of readings of power requirements taken over a period of years. The straight line curve, on which the motor capacities are based, is somewhat brighter than the average curve in order to take care of requirements which fall above the average.

In speaking of the suction on the boxes one usually refers to the suction at the header in inches of mercury, but the effective vacuum at the box is an entirely different value. Practically no information is available on this subject and while the author has had some occasion to investigate it, the investigation has not been complete enough or extensive enough to draw any conclusions or formulate any definite rules concerning the effect of vacuum on power requirements. The work already done may, however, point the way to further investigation and the ultimate use of more effective suction boxes and savings in power.

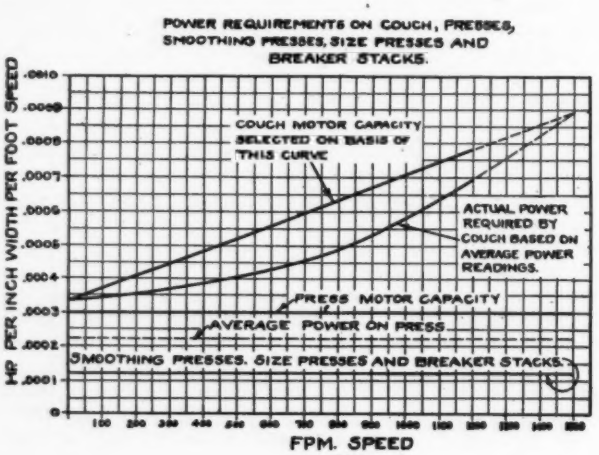
In Fig. 2, curve "A" shows the vacuum at the boxes with 4 inches of vacuum at the header. Number 1 box is the wettest box and removes more water than any of the other boxes, but it has only ½ inch vacuum at the box. Number 6 box is taking out much less water and only shows a ½ inch loss of vacuum. Curve "B" applies to 8 inches vacuum at the header with only three boxes in operation. Incidentally, both conditions were satisfactory for making the same weight of paper at the same speed.

In Fig. 3 the power constant for the couch has been plotted against vacuum on the suction box header, for six boxes on glassine paper and three boxes on kraft paper, but conditions did not permit of obtaining similar data on four and five boxes or of experimenting with different vacuums with a varying number of boxes on the same grade of paper at the same machine speed. It would appear, however, that some advantage might be gained from a redesign of the suction boxes and a tapering in the size of the pipes between the box and the header to avoid loss in vacuum and possibly secure equally good results with lower vacuum.

The Press Section

The power requirements of presses vary somewhat with the pressure of the top roll and the use of felt suction boxes, but average readings indicate about 0.000225 hp. per inch width per foot speed. In selecting press motors a power constant of 0.0003 will cover all cases. The use of suction rolls for the first press and sometimes for the second press does not affect the power required to drive the press, but it does affect the power requirements of the suction pumps.

Smoothing presses, breaker stacks and size presses are small power users and require but 0.00012 hp. per inch width per foot speed as shown in Fig. 1.


POWER REQUIREMENTS ON COUCH, PRESSES, SMOOTHING PRESSES, SIZE PRESSES AND BREAKER STACKS.
HP PER INCH WIDTH PER FOOT SPEED
COUCH MOTOR CAPACITY SELECTED ON BASIS OF THIS CURVE
ACTUAL POWER REQUIRED BY COUCH BASED ON AVERAGE POWER READINGS.
PRESS MOTOR CAPACITY
AVERAGE POWER ON PRESS
SMOOTHING PRESSES, SIZE PRESSES AND BREAKER STACKS
FPM. SPEED
FIG. 1.

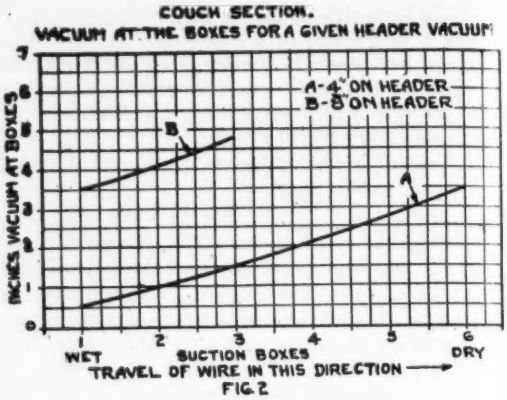


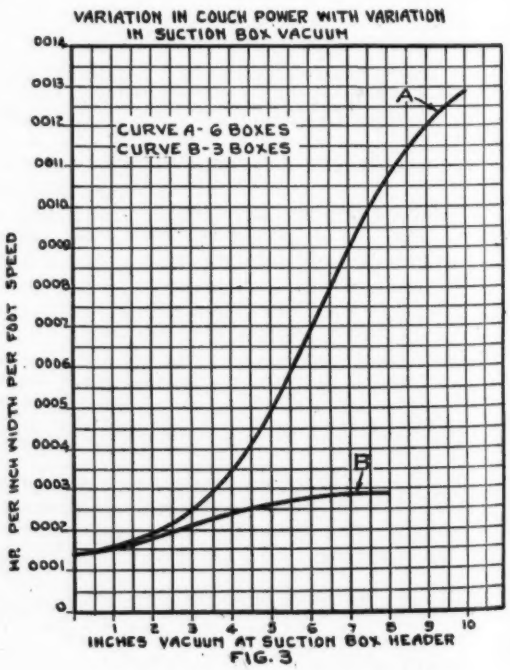
FIG. 2

The Drier Section

The driers are, of course, the only heavy inertia section on the paper machine and are subject to variations in power demand from different causes, the most common one being water.

The presence of water in the driers even in small quantities causes enormous increases in power demand and while it is readily discernible by the current reading on the motor, it has an equally detrimental effect on the temperature of the dryer which is more difficult to ascertain. Of course, the cause of this difficulty is in a faulty evacuator system.

Figs. 3a and 3b are actual tests made on driers and clearly indicate the detrimental effects of water in driers. The increase in power alone is a considerable expense and warrants careful consideration of proper evacuation sys-


VARIATION IN COUCH POWER WITH VARIATION IN SUCTION BOX VACUUM
HP PER INCH WIDTH PER FOOT SPEED
CURVE A- 6 BOXES
CURVE B- 3 BOXES
INCHES VACUUM AT SUCTION BOX HEADER
FIG. 3

tems. From the standpoint of drying efficiency and quantity of steam used, it is equally important.

Bearing trouble may cause increase in power requirements but this usually occurs at extremely low speeds and is due primarily to the destruction of the oil film. The use of pressure lubrication or roller bearings overcomes this difficulty.

Readings of power requirements indicate that a normal drier requires 0.000018 hp. per inch width per foot speed per individual drier and while the use of roller bearings has reduced this materially in some cases there is not sufficient evidence available to justify taking advantage of it. The starting torque on driers with the conventional sleeve bearing is very close to four and one half times the running torque while roller bearings will reduce the starting torque to the running torque in most cases.

The Calender Section

The calender section does not have a constant torque requirement but differs from the couch in that its maximum requirement is at low speeds on heavy weight papers and it decreases as the speed increases. The load is made up of two factors, i.e., the actual work done on the sheet and the tension in the sheet, the latter causing a transfer of load from the drier motor to the calender motor.

The number of rolls used in a stack of calenders and the weights used is usually determined by the weight of paper being manufactured; consequently, the power constant is determined from the maximum weight of paper to be manufactured rather than from the number of rolls or the speed in feet per minute.

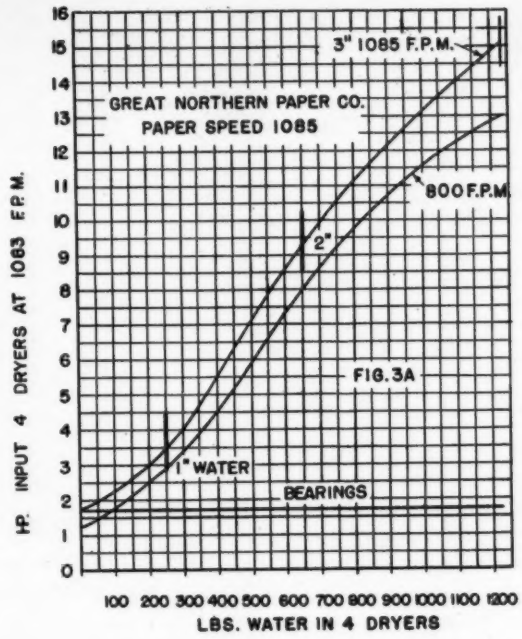
Fig. 4 shows the variation in power requirements for different weights of paper and for different speeds, it being assumed that the paper machine is approximately a constant tonnage machine, so limited by its drying capacity.

Total Load of Paper Machine

In calculating the total load of a paper machine, it is advisable to consider the total drier load as calculated and use the working load constant for the calender because the sheet tension merely unloads the drier motor, but when figuring the calender motor capacity, the larger power constant should be used.

The reel is somewhat akin to the calender in that its power requirement is determined from the weight of paper as shown in Fig. 5.

On sectional electrical drive, where each unit of the paper machine is motorized, it is clear that the motors must be selected to take care of the maximum load conditions of each individual unit although they may not carry this load at all speeds or on all grades of paper. For instance, the couch load conditions are heaviest at maximum speeds, except on glassine and bond papers which may occur at any speed, and the load conditions on the calenders and reel are heaviest at low speeds, while on the remaining sections it is practically independent of speed and weight of paper.


3" 1085 F.P.M.
GREAT NORTHERN PAPER CO.
PAPER SPEED 1085
800 F.P.M.
2"
FIG. 3A
1" WATER
BEARINGS
H.P. INPUT 4 DRYERS AT 1083 F.P.M.
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
100 200 300 400 500 600 700 800 900 1000 1100 1200
LBS. WATER IN 4 DRYERS

Knowing the conditions of operation on a paper machine such as the width, maximum and minimum speed in feet per minute, number of sections, maximum and minimum weight and kind of paper, etc., it is possible with these data to approximate the power requirements at various speeds within very close limits. Heretofore, it has been generally assumed that a paper machine was a constant torque machine requiring power in direct proportion to the speed but this is not strictly true as is evidenced by the curves in Fig. 6 which have been plotted from these data.

The speeds in feet per minute are the maximum at which the machine is to operate and on high speed machines there is a reduction in torque followed by an increase as the speed is reduced. Normally, we do not find wide range high speed machines so that a portion of their curves would seldom exist in practice.

The lower speed machines, however, do show an increas-

FIG. 3B

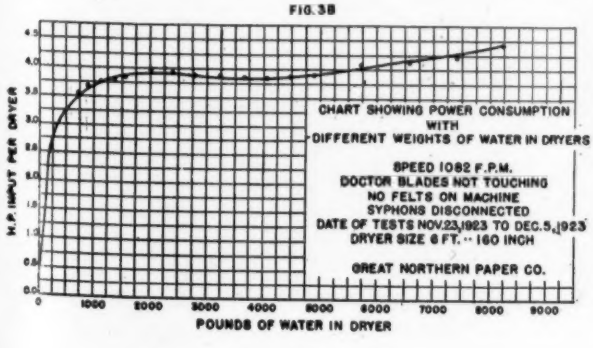
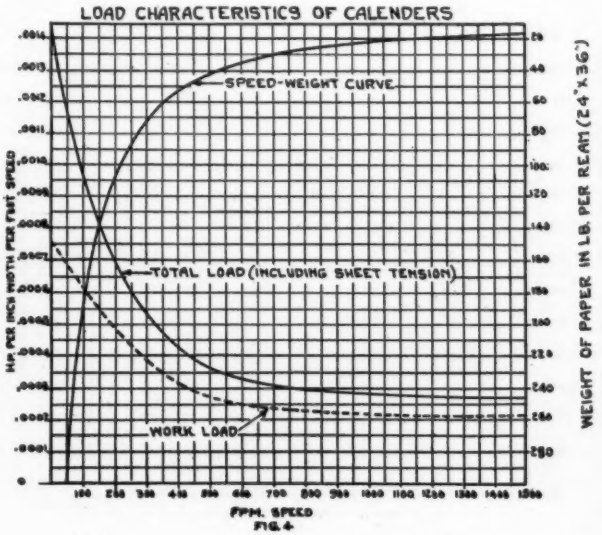


CHART SHOWING POWER CONSUMPTION WITH DIFFERENT WEIGHTS OF WATER IN DRYERS
SPEED 1082 F.P.M.
DOCTOR BLADES NOT TOUCHING
NO FELTS ON MACHINE
SYPHONS DISCONNECTED
DATE OF TESTS NOV.23,1923 TO DEC.5,1923
DRYER SIZE 6 FT. - 160 INCH
GREAT NORTHERN PAPER CO.
H.P. INPUT PER DRYER
0 1000 2000 3000 4000 5000 6000 7000 8000 9000
POUNDS OF WATER IN DRYER


LOAD CHARACTERISTICS OF CALENDERS
SPEED-WEIGHT CURVE
TOTAL LOAD (INCLUDING SHEET TENSION)
WORK LOAD
H.P. PER INCH WIDTH PER FOOT SPEED
WEIGHT OF PAPER IN LB. PER REAM (24"x36")
FPM. SPEED
FIG. 4

ing torque at reduced speeds when making heavier papers.

For general use, these power curves are not followed exactly, but certain values are used for different grades of paper; for instance, there are generally accepted constants for the couch, calender and reel such as the following and they will be found to agree very closely with the curves.

Couch

.0005 —tissue, towelling and light wrapping
.00075—news, kraft and book up to 1200 feet per minute
.0010 —machines operating from 1200 to 1500 feet per minute
.00075—bond and glassine

Calenders

.00050—up to 70-pound paper
.00075—from 70-pound to 120-pound paper
.00100—from 100 hp. to 220-pound paper

Reel

.00012—all grades except kraft
.00020—for kraft

Normal operating conditions on a paper machine are difficult to define because no two manufacturers operate their machines in the same manner. There are variations in vacuum on both the boxes and the suction rolls; there are variations in pressure on both the press rolls and the calenders; there are wide variations in sheet tension between the dryers and the calenders; there are misalignments in some machine sections and occasionally hot bearings which are nursed along until the machine can be shut down for a daily or weekly clean up. In a sense these conditions may be considered as normal, although the lack of uniformity clearly indicates a lack of definite knowledge along certain lines and points the way to justifiable investigation.

So long as the present conditions exists, motors for paper machine drives must be selected with a view to meeting all possible conditions of operation and being able to carry on until abnormal conditions can be corrected or repairs made conveniently. Continuity of service is important and conservative motor capacities are desirable especially on the couch and calender sections.

The Winder

The winder is an important machine in the industry and although not strictly a part of the paper machine, it is used in conjunction with every machine. The power requirements depend to a large extent upon the weight of paper and the tension in the sheet and are subject to rather wide variation, depending somewhat on the personal equation. There are, however, certain known facts which, used with intelligence, should lead to a greater consistency and in many cases to a material saving in power.

It is, of course, necessary to use sufficient tension to keep wrinkles out of the sheet and the tension is very definitely allied with the weight of paper. Therefore, the power requirement is a function of the weight of paper.

Experiments indicate that the rupturing strength per

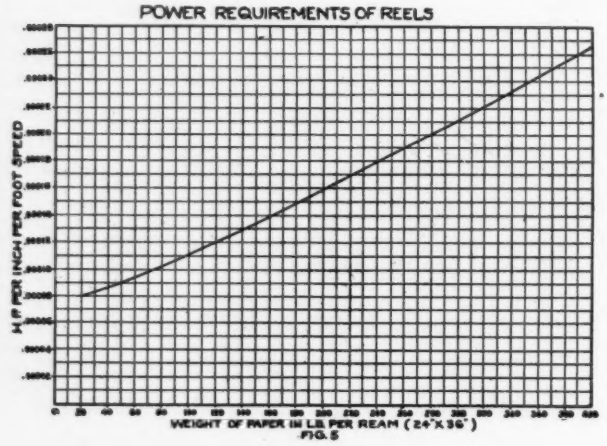


FIG. 5

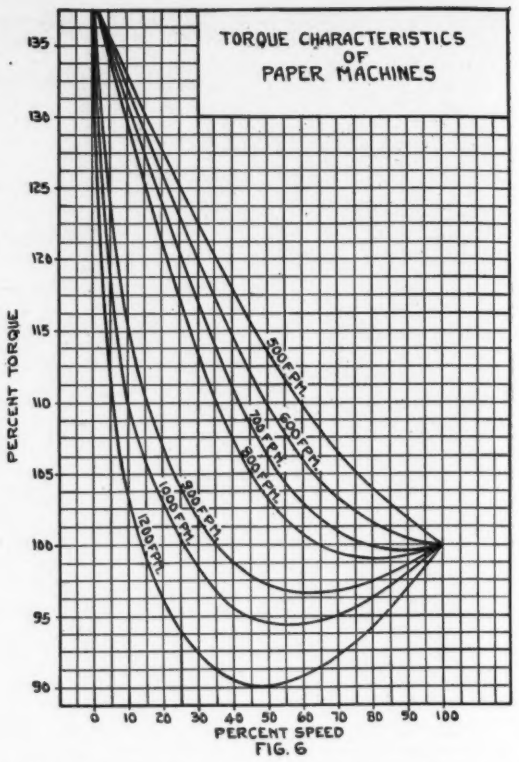
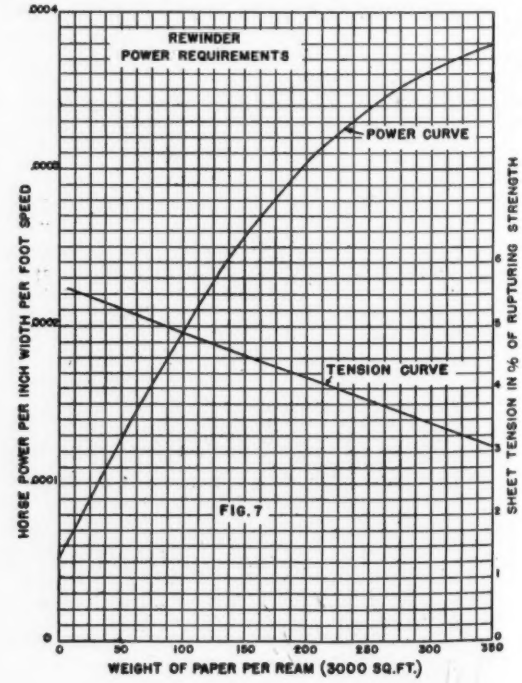


FIG. 6

inch width in pounds is generally equal to the weight per ream in pounds (basis 24 x 36—500 sheets) and the necessary tension varies from 5.6 percent on a 10-pound sheet to 2.75 percent on a 400-pound sheet.

Heavy boards are gauged by thickness in thousandth of an inch or points rather than weight per ream but generally this may be converted into pounds per ream (3000 square feet) by multiplying the number of points of ten.

Fig. 7 is characteristic of winders.


REWINDER POWER REQUIREMENTS
POWER CURVE
TENSION CURVE
HORSE POWER PER INCH WIDTH PER FOOT SPEED
SHEET TENSION IN % OF RUPTURING STRENGTH
WEIGHT OF PAPER PER REAM (3000 SQ.FT.)
FIG. 7

IMPORTS OF PAPER AND PAPER STOCK

NEW YORK, BOSTON, PHILADELPHIA AND OTHER PORTS

NEW YORK IMPORTS

WEEK ENDING APRIL 4, 1936

CIGARETTE PAPER

Champagne Paper Corp., *Ile de France,* Havre, 200 cs.; Champagne Paper Corp., *Collamer,* Havre, 600 cs.; Liggett & Myers Tobacco Co., *Collamer,* Havre, 334 cs.; R. J. Reynolds Tobacco Co., *Washington,* Havre, 163 cs.

NEWSPRINT

N. Y. Times, *Markland,* Liverpool, N. S., 527 rolls; N. Y. Tribune, *Markland,* Liverpool, N. S., 1,541 rolls; World-Telegram, *Markland,* Liverpool, N. S., 600 rolls; Bridgeport Herald, *Markland,* Liverpool, N. S., 70 rolls; Brooklyn Daily Eagle, *Markland,* Liverpool, N. S., 339 rolls; Standard Star, *Markland,* Liverpool, N. S., 88 rolls; South Norwalk Sentinel, *Markland,* Liverpool, N. S., 51 rolls; Clinton Paper Corp., *Markland,* Liverpool, N. S., 415 rolls; International Paper Co., *Cornerbrook,* St. Johns, N. B., 2,791 rolls; Bank of Montreal, *Cornerbrook,* Cornerbrook, 182 rolls; Lunham & Reeve, Inc., *Minnequa,* Hango, 239 rolls; Perkins Goodwin & Co., *Hamburg,* Hamburg, 140 rolls; Jay Madden Corp., *Hamburg,* Bremen, 131 rolls; Jay Madden Corp., *Washington,* Hamburg, 438 rolls.

PRINTING PAPER

J. H. & G. B. Siebold, Inc., *Hamburg,* Hamburg, 25 cs.; Ozalid Corp., *Hamburg,* Bremen, 29 cs.

WRAPPING PAPER

J. Whitefield, *American Banker,* London, 12 cs.; F. C. Strype, *Pennland,* Antwerp, 6 cs.; ———, *Hamburg,* Bremen, 12 bls.

PACKING PAPER

Steiner Paper Corp., *Veendam,* Rotterdam, 140 bls.

FILTER PAPEER

H. Reeve Angel & Co., Inc., *Ausonia,* London, 12 cs.; H. Reeve Angel & Co., Inc., *Berengaria,* Southampton, 55 bls., 6 cs.; C. Schleicher & Schull Co., Inc., *Hamburg,* Hamburg, 11 cs.

FILTER COMPOUND

Globe Shipping Co., *Hamburg,* Hamburg, 68 bls.

BRISTOL BOARDS

Devoe & Raynolds Co., *American Banker,* London, 1 cs.

SURFACE COATED PAPER

Gevaert Co. of America, *Pennland,* Antwerp, 80 cs.; Phoenix Shipping Co., *Hamburg,* Hamburg, 1 cs.

METAL COATED PAPER

K. Pauli Co., *Hamburg,* Bremen, 31 cs.

DECALCOMANIAS

Sellers Transportation Co., *Bremen,* Bremen, 31 cs.

TISSUE PAPER

W. J. Byrnes, *Berengaria,* Southampton, 3 cs.

GLAZED OPALINE PAPER

F. C. Strype, *Veendam,* Rotterdam, 17 cs.

WOOD PULP PAPER

A. Giese & Son, *Spaarndam,* Rotterdam, 10 cs., 15 bls.

GUMMED PAPER

G. Gennert, *Hamburg,* Hamburg, 3 cs.

PASTE BOARD

Roger & Gallet, *Ile de France,* Havre, 3 cs.

MISCELLANEOUS PAPER

Moller Products Corp., *Venice Maru,* Yokohama, 9 cs.; Corn Exchange Bank Trust Co., *Kwanto Maru,* Kobe, 25 cs.; National City Bank, *Kwanto, Maru,* Yokohama, 8 cs.; Globe Shipping Co., *Ile de France,* Havre, 5 cs.; Standard Products Corp., *Ile de France,* Havre, 14 cs.; Keller Dorian Paper Co., *Excalibur,* Marseilles, 3 cs.; Japan Paper Co., *Tai Ping,* Kobe, 198 cs.; Jay Madden Corp., *Hamburg,* Hamburg, 7 bbls.

RAGS, BAGGINGS, ETC.

O'Brien Padawer Co., *Venice Maru,* Shanghai, 300 bls. cotton waste; W. Garretson, *Venice Maru,* Shanghai, 103 bls. bagging; Boger Cotton Products Co., *Venice Maru,* Shanghai, 100 bls. cotton waste; Irving Trust Co., *American Banker,* London, 25 bls. old canvas; E. A. Stone Co., Inc., *Shinko Maru,* Kobe, 200 bls. cotton waste; Royal Manfg. Co., *Shinko Maru,* Kobe, 100 bls. cotton waste; E. J. Keller Co., Inc., *Spaarndam,* ———, 27 bls. rags; R. Blank, *Spaarndam,* Rotterdam, 150 bls. rags; E. J. Keller Co., Inc., *Pennland,* ———, 174 bls. bagging; Royal Manfg. Co., *Pennland,* Antwerp, 41 bls. cotton waste; Manufacturers Trust Co., *Pennland,* Antwerp, 66 bls. rags; Manufacturers Trust Co., *Kwanto Maru,* Shanghai, 49 bls. cotton waste; Chase National Bank, *Transylvania,* Glasgow, 99 bls. dark cottons; G. M. Graves Co., Inc., *Transylvania,* Glasgow, 59 bls. bagging; ———, *Transylvania,* Glasgow, 45 bls. bagging; J. Cohen & Sons Co., Inc., *Port Huron,* Liverpool, 11 bls. rags; W. Steck & Co., *Veendam,* Rotterdam, 19 bls. old canvas; R. Blank, *Veendam,* Rotterdam, 361 bls. rags; R. Blank, *Veendam,* Rotterdam, 61 bls. bagging; Guaranty Trust Co., *Veendam,* Rotterdam, 45 bls. rags; ———, *Veendam,* Rotterdam, 256 bls. rags; E. J. Keller Co., Inc., *Veendam,* ———, 20 bls. rags; ———, *Excalibur,* Alexandria, 8 bls. rags; W. Steck & Co., *Excalibur,* Alexandria, 214 bls. rags; Banco Coml. Italiane Trust Co., *Excalibur,* Alexandria, 124 bls. rags; E. J. Keller Co., Inc., *Excalibur,* ———, 130 bls. paper stock; E. J. Keller Co., Inc., *Excalibur,* ———, 47 bls. bagging; New England Waste Co., *Tai Ping,* Kobe, 200 bls. cotton waste; E. J. Keller Co., Inc., *Magallanes,* ———, 154 bls. rags; E. J. Keller Co., Inc., *Capulin,* ———, 62 bls. bagging; Castle & Overton, Inc., *Capulin,* Dundee, 167 bls. paper stock; ———, *Capulin,* Leith, 53 bls. rags; S. Shapiro & Sons, Inc., *Min-*

nequa, Gdynia, 62 bls. rags; ———, *Collamer,* Havre, 1,027 bls. rags; Philadelphia National Bank, *Collamer,* Havre, 549 bls. rags; Banco Coml. Italiane Trust Co., *Collamer,* Havre, 81 bls. rags; Chase National Bank, *Collamer,* Havre, 220 bls. rags; Irving Trust Co., *Collamer,* Havre, 149 bls. bagging; J. T. Flannery, *Collamer,* Dunkirk, 76 bls. rags; Philadelphia National Bank, *Collamer,* Dunkirk, 26 bls. rags; G. W. Millar & Co., Inc., *Collamer,* Dunkirk, 5 bls. bagging; G. W. Millar & Co., Inc., *Collamer,* Dunkirk, 82 bls. rags; G. W. Millar & Co., Inc., *Collamer,* Dunkirk, 37 bls. linseys; E. J. Keller Co., Inc., *Collamer,* ———, 878 bls. paper stock; E. J. Keller Co., Inc., *Collamer,* ———, 47 bls. bagging; E. Mayer, *Hamburg,* Hamburg, 10 bls. paper stock; E. J. Keller Co., Inc., *Black Gull,* ———, 234 bls. paper stock; E. J. Keller Co., Inc., *Black Gull,* ———, 65 bls. bagging; E. J. Keller Co., Inc., *Flint II,* ———, 672 bls. paper stock; E. J. Keller Co., Inc., *Executive,* ———, 265 bls. paper stock.

BAGASSE PAPER STOCK

W. R. Grace & Co., *Cumbal,* Callao, 6,505 bls.

HIDE FLESHINGS

———, *Steel Exporter,* Madras, 300 bls.

OLD ROPE

Manufacturers Trust Co., *American Banker,* London, 106 coils; W. Steck & Co., *Spaarndam,* Rotterdam, 65 coils; Darmstadt Scott & Courtney, *Veendam,* Rotterdam, 67 coils; International Purchasing Co., *Veendam,* Rotterdam, 99 coils; ———, *Capulin,* London, 223 coils; Manufacturers Trust Co., *Collamer,* Havre, 44 coils.

CASEIN

Chase National Bank, *Ile de France,* Havre, 359 bags; ———, *Collamer,* Dunkirk, 358 bags.

CHINA CLAY

English China Clays Sales Co., *Port Huron,* Liverpool, 56 bags.

ESPARTO PULP

J. H. Faunce, Inc., *Transylvania,* Glasgow, 107 rolls.

WOOD PULP

Bulkley Dunton & Co., *Spaarndam,* Rotterdam, 237 bls. wood pulp; N. Y. Trust Co., *Veendam,* Rotterdam, 226 bls. wood pup; ———, *Washington,* Hamburg, 101 bls. wood pulp, 10 tons; Castle & Overton, Inc., *Hamburg,* Hamburg, 2,800 bls. wood pulp, 560 tons; J. Andersen & Co., *Minnequa,* Gdynia, 253 bls. wood pulp, 50 tons; M. Sone, *Minnequa,* Gdynia, 550 bls. wood pulp, 110 tons.

WOOD PULP BOARDS

G. H. MacFadden & Bro., *Hamburg,* Hamburg, 120 bls.

WOOD PULP SHEETS

———, *Hamburg,* Hamburg, 70 bls.

PORTLAND IMPORTS

WEEK ENDING APRIL 4, 1936

Bulkley Dunton & Co., *Vasaholm,* ———, 500 bls. wood pulp; Gottesman & Co., Inc., *Vasaholm,* Sweden, 5,875 bls. wood pulp.

BOSTON IMPORTS

WEEK ENDING APRIL 4, 1936

———, *Spaarndam,* Rotterdam, 10 bls. rags; E. J. Keller Co., Inc., *Excalibur,* ———, 119 bls. rags; Irving Trust Co., *Collamer,* Havre, 62 bls. bagging; Ayres W. C. Jones Co., *Collamer,* Havre, 39 bls. cotton waste; ———, *Collamer,* Havre, 82 bls. cotton waste; ———, *Collamer,* Havre, 100 bls. bagging; Royal Manfg. Co., *Collamer,* Dunkirk, 26 bls. cotton waste; ———, *Collamer,* Dunkirk, 79 bls. rags; Irving Trust Co., *Collamer,* Dunkirk, 61 bls. rags; ———, *Collamer,* Dunkirk, 125 bls. thread waste; Bulkley Dunton & Co., *Capulin,* ———, 330 bls. wood pulp; Gottesman & Co., Inc., *Capulin,* Czecho-Slovakia, 972 bls. wood pulp.

PHILADELPHIA IMPORTS

WEEK ENDING APRIL 4, 1936

———, *Capulin,* Dundee, 32 bls. paper stock; Philadelphia National Bank, *Capulin,* Hamburg, 41 bls. rags; ———, *Capulin,* Hamburg, 51 bls. rags; Castle & Overton, Inc., *Capulin,* Hamburg, 2,990 bls. wood pulp, 598 tons; J. W. Hampton Jr. & Co., *Minnequa,* Hango, 628 rolls newsprint; Paper House of Penna, *Minnequa,* Copenhagen, 12 cs. wrapping paper; ———, *Minnequa,* Copenhagen, 102 bls., 1,185 rolls wrapping paper; Parsons & Whittemore, Inc., *Beran,* ———, 6,940 bls. wood pulp.

BALTIMORE IMPORTS

WEEK ENDING APRIL 4, 1936

———, *Shinko Maru,* Kobe, 360 bls. rags; ———, *Tai Ping,* Yokohama, 600 bls. rags; ———, *Capulin,* London, 65 coils old rope; Lagerloef Trading Co., *Minnequa,* Hango, 2,950 bls. sulphite, 582 tons; Lagerloef Trading Co., *Minnequa,* Hango, 3,700 bls. sulphate, 740 tons; ———, *Minnequa,* Hango, 231 rolls newprint; Hearst Consolidated Publications, Inc., *Minnequa,* Hango, 329 rolls newsprint; Gottesman & Co., Inc., *Minnequa,* Hango, 250 bls. dry pulp, 50 tons; J. Andersen & Co., *Minnequa,* Hango, 180 bls. mechanical pulp, 30 tons; Lagerloef Trading Co., *Minnequa,* Hango, 2,600 bls. mechanical pulp, 520 tons; Castle & Overton, Inc., *Minnequa,* Hango, 1,398 bls. sulphite, 275 tons; Johaneson Wales & Sparre, Inc., *Minnequa,* Hango, 450 bls. mechanical pulp, 91 tons; Johaneson Wales & Sparre, Inc., *Minnequa,* Gdynia, 1,350 bls. wood pulp, 135 tons; Parsons & Whittemore, Inc., *Kem,* ———, 3,925 bls. wood pulp; Gottesman & Co., Inc., *Tennessee,* Norway, 1,950 bls. wood pulp; Bulkley Dunton & Co., *Milos,* ———, 3,575 bls. wood pulp.

MOBILE IMPORTS

WEEK ENDING APRIL 4, 1936

Bank of Montreal, *Cornerbrook,* Cornerbrook, 2,649 rolls newsprint.

NEW ORLEANS IMPORTS

WEEK ENDING APRIL 4, 1936

Bank of Montreal, *Cornerbrook,* Cornerbrook, 5,162 rolls newsprint; Gottesman & Co., Inc., *Sydland,* Finland, 500 bls. wood pulp.

Nashua Gummed Reports Profit of $234,787

The Nashua Gummed and Coated Paper Company reports for 1935 a net profit of $234,787. This compares with profit of $195,329 in 1934. There was credited to surplus last year $164,777 in dividends received from subsidiaries. Net sales last year were $4,849,913, against $4,297,967 in 1934.

Balance sheet as of December 31, 1935, shows current assets of $1,662,191, current liabilities $623,935, and net working capital, $1,038,256. This compares with working capital of $1,138,581 at the close of 1934.

Samson Paper Co. Leases Space

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., April 6, 1936—Approximately 12,000 square feet of space in a building here at 333 West Walnut street, has been leased for a long term to the Samson Paper Company, jobbers of paper products. The company will move from its old location at 546 South Meridian street.

New York Market Review

Office of the PAPER TRADE JOURNAL,
Wednesday, April 8, 1936.

Steadiness prevails in the local paper market. Demand for the various standard grades of paper is fairly persistent. Operations at the paper mills affected by the recent flood conditions are gradually approaching normal. Sales forces of the leading paper organizations express confidence in the future trend. Prices generally remain unchanged.

According to expert opinions the volume of advertising in the leading newspapers for the current year will be the largest since 1930. Substantial gains were registered for the first quarter, national lineage advancing from 12 to 15 per cent over the record in the corresponding period of 1935. The price situation is improving.

The fine paper market is exhibiting a strong undertone, although deliveries have been retarded through flood damage. Prices are steady to firm. Tissues are going forward in good volume. The coarse paper market is sharing the general business improvement. Demand for paper board is fairly active. Prices are firmer.

Mechanical Pulp

Some improvement transpired in the ground wood pulp market. Manufacturing operations in North America and abroad are being maintained in sufficient volume to take care of current requirements. Prices of imported mechanical pulp are higher. No. 1 moist and dry are now quoted at $23 to $24 per ton, on dock, Atlantic ports.

Chemical Pulp

The position of the chemical pulp market continues strong. Offerings of imported and domestic grades are decidedly scarce at present, with the result that quotations are very firm. Bleached sulphite and kraft pulps are being booked in good volume for 1937 delivery.

Old Rope and Bagging

Paper mill demand for old rope is moderately active. Foreign and domestic old manila rope are fairly steady. Small mixed rope is slightly firmer. The bagging market is rather quiet. Scrap and gunny bagging are only moving slowly. Roofing bagging is in light request. Prices are easier.

Rags

The position of the domestic rag market is practically unchanged, despite reports of mill losses in the recent floods. New domestic rags continue steady, with No. 1 white shirt cuttings especially strong, due to both foreign and domestic interest. Roofing rags are softer and prices on certain grades have declined.

Waste Paper

Conditions in the paper stock market are irregular. Board mill demand for the lower grades is restricted. Quotations on strictly folded news and No. 1 mixed paper are easier. The higher grades are spotty. White envelope cuttings and hard and soft white shavings are moderately active. Book stock, however, is dull.

Twine

No radical changes have been reported in the local twine market. Due to Easter requirements, demand for the various varieties has been well sustained. The outlook for the future, however, is considered uncertain, in some quarters. prices remain steady and unchanged, despite the usual competition for desirable orders.

Specifications of the Crossett Paper Machine

The paper making machine for the Crossett Lumber Company, of Crossett, Ark., the order for which was recently received by the Bagley & Sewall Company, of Watertown, N. Y., through the office of Hardy S. Ferguson & Co., New York, will conform to the following brief specifications:

This machine to be designed for various grades of kraft paper.

Will be 210 inches in width.

Range of speeds to be from 200 to 1200 feet per minute.

Fourdrinier of latest high-speed shaking design ot quick-wire-change type.

Suction couch.

Two suction presses.

Smoothing press.

60-inch driers.

Framing will be of the box-section type, and in case of the driers, all gearing will be fully enclosed.

The machine will be practically 100 per cent anti-friction bearings.

There will be an 8-roll heavy calender stack.

Automatic reel.

Latest design of slitter and winder, with roll-handling attachment.

The drive will be of the electric sectional type.

This machine is furnished on a six-month delivery.

Every feature will be designed and constructed to provide a machine of the most modern type and highest efficiency.

L. Glickman & Co. Complete Addition

L. Glickman & Co., manufacturers of paper bags, have recently completed the construction of an addition to their building, located at 505-519 Johnson avenue, Brooklyn, N. Y. New machinery and equipment to facilitate the manufacture of specialty bags has been installed at a cost of $75,000. The firm, established in 1898, is now the parent company of the United States Paper Bag Company, Inc. and sole sales agent for the Crescent Paper Dish Company, Inc., manufacturers of waxed one-piece food trays.

With plans for a nation-wide sales organization, the company has re-organized its sales department with the acquisition of L. D. Engelson as sales manager and G. November and S. E. Weiner, assistants.

Micellaneous Markets

Office of the PAPER TRADE JOURNAL,
Wednesday, April 8, 1936.

BLANC FIXE.—The position of the blanc fixe market is practically unchanged. Prices are holding to formerly quoted levels. The pulp is selling at $42.50 to $45 per ton, in bulk; while the powder is offered at 3½ to 3¾ cents per pound, in barrels, at works.

BLEACHING POWDER.—Steadiness prevails in the bleaching powder market. The contract movement is well up to average. In most instances prices continue steady to firm. Bleaching powder is quoted at $2 to $2.25 per 100 pounds, in drums, at works.

CASEIN.—The casein market is firm. Domestic standard ground is quoted at 15 and finely ground at 15½ cents per pound. Argentine and French standard ground are selling at 14 and finely ground at 14½ cents per pound, all in bags, car lot quantities.

CAUSTIC SODA.—Paper mill demand for caustic soda is fairly persistent. Contract shipments are moving in good volume. Solid caustic soda is quoted at $2.55 to $2.60; while the flake and ground are selling at $2.95 to $3 per 100 pounds, in drums, at works.

CHINA CLAY.—The china clay market is displaying strength. Demand from the paper mills is fairly brisk. Prices are steady to firm. Imported clay is quoted at $13.50 to $21 per ton, ship side; while domestic paper making clay is selling at $6.50 to $12 per ton.

CHLORINE.—Some improvement transpired in the chlorine market. Demand from the paper mills is more active. Contract shipments are moving freely. Prices are steady. Chlorine is quoted at $2.15 to $2.55 per 100 pounds, in tank cars, at works.

ROSIN.—The rosin market is stronger. Paper making gum rosin is now quoted at $4.30 and wood rosin at $4.25 per 280 pounds, gross weight, in barrels, at Savannah. Seventy per cent rosin size is selling at $2.54 per 100 pounds, in tank cars, at works.

SALT CAKE.—Conditions in the salt cake market are satisfactory. Demand from the paper mills is well sustained. Salt cake is quoted at $12 to $13; chrome salt cake at $11 to $12 per ton, at works. Imported salt cake is selling at $12 to $13 per ton, ship side.

SODA ASH.—The soda ash market is exhibiting a strong undertone. Shipments against contract are moving freely. Prices are firm. Quotations on soda ash, in car lots, at works, per 100 pounds, are as follows: in bulk, $1.05; in bags, $1.20; and in barrels, $1.50.

STARCH.—No radical changes transpired in the starch market. Demand from the paper mills is routine. Prices remain unchanged. Special paper making starch is quoted at $3.10 per 100 pounds, in bags; and at $3.37 per 100 pounds, in barrels, at works.

SULPHATE OF ALUMINA.—Demand for sulphate of alumina is holding up well. The contract movement is normal. Prices remain unchanged. Commercial grades are quoted at $1.35 to $1.60 and iron free at $2 to $2.25 per 100 pounds, in bags, at works.

SULPHUR.—The sulphur market is steady. Yearly contracts are quoted at $18 per long ton, in bulk, on orders of 1,000 tons, or over and $20 on any smaller quantity. On spot and nearby carloads the quotation is $21 per ton. All quotations are in car lots, at works.

TALC.—Most of the business transacted in the talc market during the past week was along routine lines. Prices remain unchanged. Domestic talc is quoted at $16 to $18 per ton, at eastern mines; while imported talc is selling at $23 to $30 per ton, on dock.

Market Quotations

Paper

Rag Content Bond & Ledgers—Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	7.75	8.75
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50

Book, Cased—

S. & S. C.	5.35	@	5.75
S. & S. C. Litho.	5.60	@	6.00
M. F.	5.10	@	5.50
Coated and Enamel	5.90	@	6.55
Coated Litho	5.90	@	6.55

Tissues—Per Ream—

White No. 1	.82½	@	—
White No. 1 M. G.	.77½	@	—
White No. 1½	.62½	@	—
White No. 2	.60	@	—
Anti-Tarnish M. G.	.67½	@	—
Colored	.80	@	—
Kraft	.67½	@	—
Manila	.60	@	—
Unbleached Toilet.	2.60	@	3.30
Bleached Toilet	3.94	@	5.26

Paper Towels—

Unbleached	2.10	@	3.35
Bleached	3.30	@	3.70

Manila—

No. 1 Jute	9.00	@	9.25
No. 2 Jute	7.75	@	8.50
No. 1 Wood	4.00	@	5.25
No. 2 Wood	3.50	@	4.00

Fibre Papers—

No. 1 Fibre	4.25	@	5.50
No. 2 Fibre	4.00	@	4.75

(Delivered New York)

News, per ton—

Roll, contract	41.00	@	—
Sheets	46.00	@	—

Kraft—

No. 1 Northern	4.12½	@	4.75
Standard	4.00	@	—
Southern	3.87½	@	—

Boards—per ton—

News	37.50	@	—
Chip	37.50	@	—
Sgl. Mla. Ll. Chip.	42.50	@	45.00
Jute Lined Chip	42.50	@	45.00
Kraft Liners	60.00	@	62.50
White Pat. Coated	55.00	@	57.50
Binders Boards	67.00	@	75.00

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—Moist	23.00	@ 24.00
Dry	23.00	@ 24.00

(F. o. b. Mill)

No. 1 Domestic and Canadian	18.00	@ 24.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—

Division 1	2.60	@	2.90
Division 2	2.55	@	—*
Division 3	2.50	@	—*

Prime Qualities—

Class 1. All Prime Easy Bleaching	2.05	@	—*

Other Than Easy Bleaching—

Class 2. Higher than Standard	2.00	@	—*
Class 3, Standard	1.95	@	—*
Class 4, Lower than Standard	1.90	@	—*

(On Dock, Atlantic Ports)

Kraft No. 1	1.85	@	1.95
Kraft No. 2	1.70	@	1.80

(F. o. b. Pulp Mill)

Kraft Domestic	1.80	@	1.90

(Delivered)

Soda Bleached	2.60	@	—

* Add 60 Cents per short ton, dock charges, for Albany; $2.00 for Lake Ports East and $3.00 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—New White, No. 1	8.00	@	8.15
Silesias No. 1	5.50	@	5.75
New Unbleached	8.25	@	8.50
New Soft Blacks	3.75	@	4.00
Blue Overall	5.75	@	6.00
Fancy	3.25	@	3.50
Washables	2.25	@	2.50
Mixed Khaki Cuttings	3.50	@	3.75
O. D. Khaki Cuttings	4.25	@	4.50
Men's Corduroy	2.00	@	2.25
New Mixed Blacks	2.75	@	3.00

Old Rags

White, No. 1—Repacked	3.00	@	3.50
Miscellaneous	2.75	@	3.25
White, No. 2—Repacked	1.75	@	2.25
Miscellaneous	1.50	@	1.75
Thirds and Blues—Repacked	1.75	@	1.85
Miscellaneous	1.45	@	1.55
Roofing Rags—No. 1	2.00	@	2.10
No. 2	1.70	@	1.80
No. 3 (bagging)	1.60	@	1.70
No. 4	1.60	@	1.70
No. 5A	1.00	@	1.10

Foreign Rags

New Rags

New Dark Cuttings	2.00	@	2.25
New Mixed Cuttings	1.80	@	1.90
New Light Silesias	3.75	@	4.00
Light Flannelettes	4.25	@	4.50
New White Cuttings	6.50	@	7.00
New Light Oxfords	3.25	@	3.50
New Light Prints	2.75	@	3.00

Old Rags

No. 1 White Linens	7.50	@	8.00
No. 2 White Linens	6.50	@	7.00
No. 3 White Linens	4.50	@	5.00
No. 4 White Linens	2.25	@	2.50
No. 1 White Cotton	4.25	@	4.75
No. 2 White Cotton	3.25	@	3.75
No. 3 White Cotton	2.50	@	2.75
No. 4 White Cotton	1.90	@	2.15
Extra Light Prints	2.00	@	2.25
Ord. Light Prints	1.75	@	1.85
Med. Light Prints	1.55	@	1.65
Dutch Blue Cottons	2.00	@	2.25
French Blue Linens	2.30	@	2.40
German Blue Linens	2.15	@	2.25
German Blue Cottons	1.70	@	1.80
Checks and Blues	1.70	@	1.80
Linsey Garments	2.50	@	2.60
Dark Cottons	2.00	@	2.35
Old Shopperies	1.00	@	1.05
New Shopperies	1.25	@	1.35
French Blues	2.00	@	2.25

Old Rope and Bagging

(Prices to Mill f. o. b. N. Y.)

Gunny No. 1—Foreign	2.20	@	2.25
Domestic	2.25	@	2.35
Wool Tares, light	1.75	@	2.00
Wool Tares, heavy	2.25	@	2.35
Bright Bagging	1.75	@	1.80
Manila Rope—Foreign	2.40	@	2.50
Domestic	2.25	@	2.35
Mixed Strings	1.00	@	1.05
New Burlap Cut	2.00	@	2.25
Hessian Jute Threads—Foreign	2.60	@	2.75
Domestic	2.80	@	3.00

Old Waste Papers

(F. o. b. New York)

Shavings—White Envelope Cuttings	2.65	@	2.75
Ordinary Hard White No. 1	2.25	@	2.35
Hard White No. 2	2.10	@	2.20
Soft White No. 1	2.05	@	2.15
Flat Stock—Stitchless	.65	@	.75
Over issue Mag	.65	@	.75
Solid Flat Book	.55	@	.60
Crumpled No. 1	.35	@	.40
Solid Book Ledger	1.50	@	1.65
Ledger Stock	.85	@	.90
New B. B. Chips	.30	@	.35
Manilas—New Env. Cut	1.75	@	1.85
New Cuttings	1.35	@	1.45
Bogus Wrapper	.40	@	.50
Old Kraft Machine—Compressed bales	1.25	@	1.35
News—No. 1 White News	1.45	@	1.50
Strictly Overissue	.50	@	.55
Strictly Folded	.35	@	.40
No. 1 Mixed Paper	.27½	@	.32½

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Any Metal **Any Perforation**

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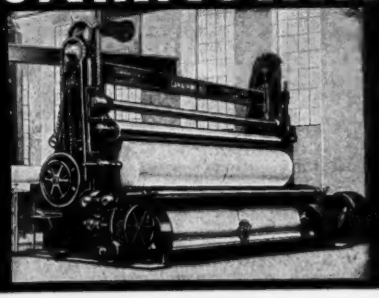
CAMACHINE 19



High Speed Winder for Book Kraft Newsprint and Board Mills
Standard Widths 100 to 200
Winds Rolls 40 or 60 in Diameter
Operating Speed up to 2,800 F.P.M.

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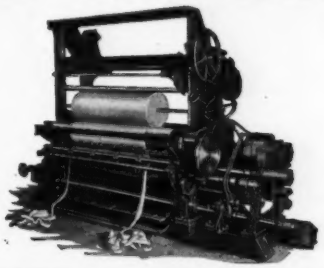

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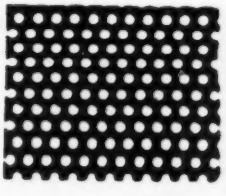

".065" Round

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CHEMIPULP PROCESS, INC.
CHEMICAL PULP MILL ENGINEERS
CHEMICAL PULPING PROCESSES, OPERATING SURVEYS APPRAISALS ESTIMATES
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WATERTOWN, N. Y.
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PACIFIC COAST OFFICE: 3311 First Ave., So., SEATTLE, WASH.

Twines

(F. o. b. Mill)

(Soft Fibre)

Coarse Polished—			
India	.13¼	@	.15¼
Belg. White Hemp	.14¼	@	.17¾
India Compress	.13¾	@	.14¾
Fine Polished—			
Fine India	.21½	@	.23½
Special	.19½	@	.21½
Unpolished—			
Box	.12	@	.12½
Paper Makers	.09	@	.13½
Tube Rope	.10	@	.15½
Wall Paper	.11	@	.14½
Wrapping	.15½	@	.21
Special	.15	@	.15½
Soft Fiber Rope	.12½	@	.12¾

(Hard Fibre)

Bond	.12	@	.20½
Anchor	.11½	@	.13
Manila	.21	@	.22

CHICAGO

Paper

(F. o. b. Mill)

Rag Bond	.12	@	.40
Water Marked Sulphite Bond	.06¼	@	.11
Sulphite Bond	.05½	@	.07¼
Superfine Writing	.18	@	.24
No. 1 M. F. Book	.06½	@	.07¼
No. 2 M. F. Book	.05¼	@	.06¼
No. 1 S.&S.C. Book	.06¾	@	.07¾
No. 2 S.&S.C. Book	.05¾	@	.06½
Coated Book	.07	@	.12
Coated Label	.07	@	.08½
No. 1 Manila	.04¼	@	.05¾
No. 1 Fibre	.04¾	@	.05¼
No. 2 Manila	.04½	@	.04¾
Butcher's Manila	.03¼	@	.03¾
No. 1 Kraft	4.75	@	5.00
Southern Kraft	3.88	@	4.25
No. 2 Kraft	3.88	@	4.25
Wood Tag Boards	.04¼	@	.06¼
Sulphite Screenings	.03	@	.03¼
Manila Tissue	.05¾	@	.07
White Tissue	.07	@	.09

(Delivered Central Territory)

News, per ton—			
Rolls, contract	42.00	@	—
Sheets, open	47.00	@	—
Boards, per ton—			
Plain Chip	46.50	@	—
Solid News	50.00	@	—
Manila Lined Chip	55.00	@	—
Patent Coated	65.00	@	—
Container Lined—			
85 Test, per 1000 sq. ft.			1.70
100 Test, per 1000 sq. ft.			1.85

Old Papers

(F. o. b. Chicago)

Shavings—			
No. 1 White Envelope Cuttings	1.70	@	2.00
No. 1 Hard White	1.40	@	1.65
No. 1 Soft White	1.25	@	1.50
Ledger & Writings	.70	@	.80
Solid Books	.60	@	.70
Blanks	1.00	@	1.05
Krafts	.80	@	.90
New Kraft Cuts	1.20	@	1.30
Manila Env. Cuts	1.25	@	1.30
Ex. No. 1 Manila	.90	@	1.00
Print Manila	.40	@	.50
Overissue News	.40	@	.45
Old Newspapers—			
No. 1	.30	@	.35
No. 1 Mixed Paper	.25	@	.30
Roofing Stocks—			
No. 1	30.00	@	—
No. 2	28.00	@	—

PHILADELPHIA

Paper

Rag Content Bond & Ledgers—
Delivered Zone 1

	Bonds		Ledgers
100% Rag Ext. No. 1	.36		.37
100% Rag	.28		.29
75% Rag	.21		.22
65% Rag	.18		.19
50% Rag	.15		.16
25% Rag	.12½		.13½

Sulphite Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	7.75	8.75
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50

F.o.b. Mill

Book, M. F.	5.00	@	—
Book, S. S. & C.	5.25	@	—
Book, Coated	6.15	@	—
Coated Lithograph	6.15	@	—
No. 1 Jute Manila	10.50	@	—
Manila Sul., No. 1	6.75	@	—
Manila No. 2	4.25	@	—
No. 1 Kraft	6.00	@	—
Southern Kraft	5.00	@	—
News Print Rolls	40.00	@	—
Straw Board	40.00	@	45.00
News Board	40.00	@	—
Chip Board	37.50	@	—
Wood Pulp Board	70.00	@	85.00
Binder Boards—			
No. 1, per ton	75.00	@	80.00
No. 2, per ton	70.00	@	75.00
Carload lots	65.00	@	70.00
Tarred Felts—			
Regular	52.25	@	54.25
Slaters (per roll)	.84	@	.94

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White, No. 1.	.09	@	.09½
New White, No. 2.	.05½	@	.06
Light Silesias	.05½	@	.06½
Silesias, No. 1	.04½	@	.05
Black Silesias, soft.	.03½	@	.04
New Unbleached	.06½	@	—
Washable, No. 1	.02	@	.02½
Blue Overall	.06	@	.06½
Cottons—According to grades—			
Washable, No. 2	.02½	@	.04½
New Blue	.02	@	.02½
Fancy	.03	@	—
New Black Soft	.04¼	@	.04¾
New Light Seconds	.04	@	.04¼
New Dark Seconds	2.00	@	—
Khaki Cuttings—			
No. 1 O. D.	.04½	@	.05
No. 2 Mixed	.03½	@	.04½
Corduroy	.02¼	@	.02½
New Canvas	.04½	@	.05
New Black Mixed.	.02¼	@	.02½

Domestic Rags (Old)

White No. 1—			
Repacked	4.00	@	4.50
Miscellaneous	3.00	@	3.50
Thirds and Blues—			
Miscellaneous	2.00	@	2.25
Repacked	2.50	@	2.75
Black Stockings (Export)	4.50	@	5.00
Roofing Stock—			
Foreign No. 1	2.35	@	—
Domestic No. 1	1.80	@	1.85
Domestic No. 2	1.60	@	1.65
Roofing bagging	1.45	@	—

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	2.00	@	—
Domestic	2.25	@	—
Manila Rope	2.75	@	3.00
Sisal Rope	1.75	@	2.00
Mixed Rope	1.00	@	1.10
Scrap Burlaps—			
No. 1	2.00	@	2.50
No. 2	.90	@	1.00
Wool Tares, heavy	3.00	@	3.25
Mixed Strings	1.00	@	1.10
No. 1 New Light Burlap	3.00	@	3.50
New Burlap Cuttings	2.50	@	2.75

Old Papers

(F. o. b. Phila.)

Shavings—			
No. 1 Hard White	2.30	@	2.40
No. 2 Hard White	2.10	@	2.20
No. 1 Soft White	1.80	@	1.85
No. 2 Soft White	1.40	@	1.45
No. 1 Mixed	—	@	.85
Solid Ledger Stock	1.50	@	1.60
Ledger Stock, white	1.15	@	1.20
Ledger Stock, colored	.85	@	.90
No. 1 Books, heavy	.65	@	.70
Manila Cuttings	1.50	@	1.60
Print Manila	.50	@	.60
Container Manila	.50	@	.60
Kraft Paper	1.10	@	1.20
No. 1 Mixed Paper	.35	@	.40
Straw Board Chip	.40	@	—
Binders Board Chip	.40	@	—
Corrugated Board	.60	@	.65
Overissue News	.60	@	—
Old Newspapers	.40	@	—

BOSTON

Paper

Rag Content Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	.36	.37
100% Rag	.28	.29
75% Rag	.21	.22
65% Rag	.18	.19
50% Rag	.15	.16
25% Rag	.12½	.13½

Sulphite Bond & Ledgers—
Delivered Zone 1

	Bonds	Ledgers
No. 1 Sulphite	7.75	8.75
No. 2 Sulphite	6.75	7.75
No. 3 Sulphite	6.00	7.00
No. 4 Sulphite	5.50	6.50

F.o.b. Mill

Book, Super	.06	@	.09
Book, M. F.	.05½	@	.08½
Book, Coated	.08½	@	.18
Coated Litho	.09	@	.12
Jute Manila No. 1	.11	@	.13
Manila, Sul. No. 1	.04¾	@	.06½
Manila, Sul. No. 2	.03¾	@	.04½
No. 1 Kraft	.04½	@	.05
No. 2 Kraft	.04	@	.04¼

(Delivered New England points)

Southern Kraft	.03¾	@	—
News Print Rolls	39.50	@	—
Straw Board, rolls	.009	@	35.00
Filled News Board	40.00	@	45.00
Chip Board	37.50	@	40.00
Single Manila Lined Chip	47.50	@	52.50
Single White, Patent Coated News Board (Bender)	55.00	@	65.00
Wood Pulp Board	70.00	@	75.00
Binder Boards (Standard Grade)	67.00	@	75.00

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White	2.00	@	2.20
No. 1 Soft White	1.75	@	1.90
No. 2 Mixed	.75	@	.80
Solid Ledger Books	1.50	@	1.75
Overissue Ledger Stock	1.15	@	1.30
Mixed Ledgers	.85	@	.90
No. 1 Books, heavy	.60	@	.70
No. 1 Books, light	.50	@	.60
Crumpled Stitchless Book Stock	.50	@	.60
Manila Env. Cuttings	1.50	@	1.60
No. 1 Old Manila	.60	@	.65
White Blank News	1.30	@	1.35
No. 1 Kraft	1.15	@	1.20
Mixed Papers	.22½	@	.25
Print Manila	.47½	@	.50
Container Manilas	.27½	@	—
Old Newspapers	.27½	@	.32½
Overissue News	—	@	.40
Box Board Chips	—	@	.25
Corrugated Boxes	.40	@	.45
Kraft corrugated boxes	.95	@	1.00
Screening Wrappers	.40	@	.45

Bagging

(F. o. b. Boston)

Manila Rope—			
Foreign	2.25	@	2.35
Domestic	2.25	@	2.35
Transmission Rope	1.30	@	1.40
Jute Rope	2.00	@	2.25
Jute Carpet Threads	1.00	@	1.10
Gunny No. 1—			
Foreign	2.05	@	2.15
Domestic	1.90	@	2.00
Bleachery Burlap	4.50	@	5.00
Scrap Burlap—			
Foreign	2.10	@	2.15
Domestic	1.75	@	1.90
Scrap Sisal	2.00	@	2.25
Scrap Sisal for Shredding	2.25	@	2.50
Wool Tares, heavy	2.25	@	2.35
New Burlap Cuttings	2.25	@	2.35
Australian Wool Pouches	2.75	@	2.85
Heavy Baling Bagging	2.00	@	2.25
Paper Mill Bagging	1.75	@	2.00
Bagging No. 2	1.25	@	1.50

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints	.01¼	@	.02
New White No. 1	.08	@	.08¼
New White No. 2	.04	@	.04¼
Silesias No. 1	.05½	@	.06
New Black Silesias	.03½	@	.04¼
Soft Unbleached	.07¼	@	.07¾
Blue Cheviot	5.25	@	5.50
Fancy	.02½	@	.02¾
Washable	.0165	@	.0170
Cottons—According to grades—			
Blue Overalls	5.50	@	6.00
New Black, soft	.04	@	.04¾
Khaki Cuttings	.04	@	.04¼
O. D. Khaki	.03¾	@	.04¼
Corduroy	.01¾	@	.02
New Canvas	—	@	.05
B.V.D. Cuttings	—	@	.06¼

Domestic Rags (Old)

(F. o. b. Boston)

Canvas	.04½	@	—
White No. 1—			
Repacked	—	@	2.75
Miscellaneous	2.50	@	2.75
White No. 2—			
Repacked	1.90	@	2.00
Miscellaneous	2.00	@	2.25
Twos and Blues	1.75	@	2.25
Thirds and Blues—			
Repacked	1.37½	@	1.75
Miscellaneous	1.25	@	1.62½
Black Stockings	3.90	@	4.00
Roofing Stock—			
No. 1	1.90	@	2.00
No. 2	1.60	@	1.70
No. 3	1.50	@	1.60

Foreign Rags

(F. o. b. Boston)

Dark Cottons	1.75	@	1.85
New White Shirt Cuttings	6.50	@	6.75
Dutch Blues	2.25	@	2.50
New Checks & Blues	2.50	@	3.00
Old Fustians	1.90	@	2.00
Old Linsey Garments	2.00	@	2.10
New Silesias	4.75	@	5.25

TORONTO

Paper

(F. o. b. Mill)

Bond—			
No. 1 Sulphite	.11	@	—
No. 2 Sulphite	.08¾	@	—
No. 1 Colored	.12	@	—
No. 2 Colored	.09	@	—
Ledgers			
Ledgers, No. 1	.34½	@	—
Ledgers, No. 2	.25½	@	—
Writing	.09	@	.09½
Book—			
No. 1 M. F. (Carloads)	6.50	@	—
No. 2 M. F. (Carloads)	6.00	@	—
No. 3 M. F. (Carloads)	6.00	@	—
No. 1 S. C. (Carloads)	7.00	@	—
No. 2 S. C. (Carloads)	6.50	@	—
No. 3 S. C. (Carloads)	6.50	@	—
No. 1 Coated and Litho	12.00	@	—
No. 2 Coated and Litho	10.50	@	—
No. 3 Coated and Litho	9.50	@	—
Coated tinted	13.00	@	—
Wrapping—delivered—			
Rag Brown	4.75	@	—
White Wrap	3.50	@	—
"B" Manila	4.80	@	—
No. 1 Manila	5.40	@	—
Fiber	5.40	@	—
Kraft, M. F.	5.90	@	—
Kraft, No. 2	5.40	@	—

(F. o. b. Cars Toronto)

News, per ton—			
Rolls (contract)	40.50	@	—
Sheets	45.00	@	—

Pulp

Ground wood	27.00	@	—
Unbleached Sulphite	42.00	@	—
Book (Class 1)	58.00	@	—
Writing (Class 2)	59.00	@	—
Select (Class 3)	60.00	@	—

Old Waste Paper

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut	2.00	@	2.25
Soft White	1.60	@	1.90
White Blk. News	1.25	@	1.40
Book and Ledger—			
Flat Magazine and Book Stock (old)	.90	@	1.00
Light and Crumpled Book Stock	.80	@	.90
Ledgers and Writings	1.00	@	1.05
Manilas—			
New Manila Cut	1.25	@	1.40
Printed Manilas	.50	@	—
Kraft	1.00	@	1.60
News and Scrap—			
Strictly Overissue	.55	@	—
Strictly Folded	.50	@	—
No. 1 Mixed Paper	.40	@	—

Domestic Rags

(Price to mills, f. o. b. Toronto)

No. 1 White Shirt Cuttings	.07¼	@	.07½
Fancy Shirt Cuttings	.02¼	@	.02¾

PAPER TRADE JOURNAL

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